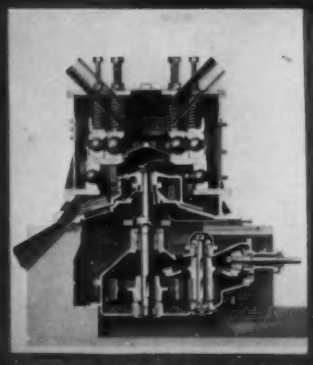
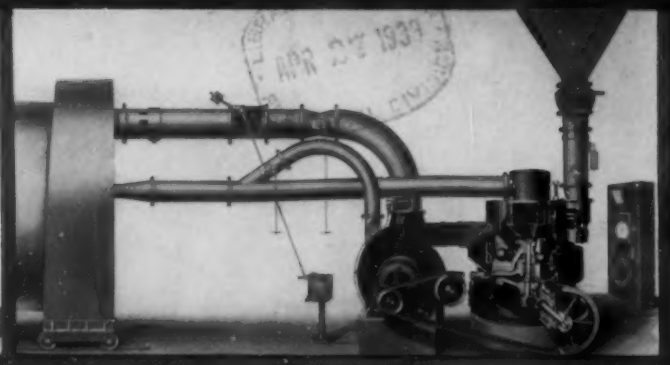
Rock Products

THE INDUSTRY'S RECOGNIZED AUTHORITY

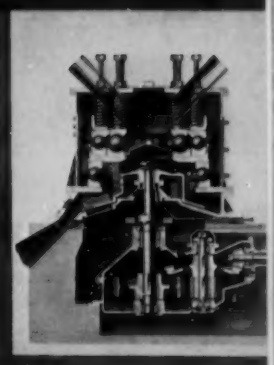
APRIL, 1939



RAW MATERIAL DEPT.



DIRECT-FIRED KILN



CLINKER GRINDING

The Cement Plant of *tomorrow* -- AVAILABLE TODAY

You will get the most out of your modernization program if B & W Automatic Equipment is installed for raw material grinding, for direct firing, and for clinker grinding.

Bulletins C-10 and F-907A on request.

Here are the reasons:

- **No dryers**
- **Few units**
- **Minimum floor space**
- **Low demand-load**
- **Reduced power-consumption**
- **Low maintenance**
- **Flexibility**
- **No dust**

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET . . . NEW YORK, N. Y.

BABCOCK & WILCOX

NOW ALL THE WAY from Pole to Shovel

IT'S TELLURIUM CABLE

. . makes a simple, low-cost layout . . . easy to install and to move . . . . fully protected . . . able to give long service

YOU may pick up tips from this simple layout. Designed by G. E. for the Louisville Cement Corp., it shows modern trends in cable practice that are cutting costs, improving service, and adding to profits.

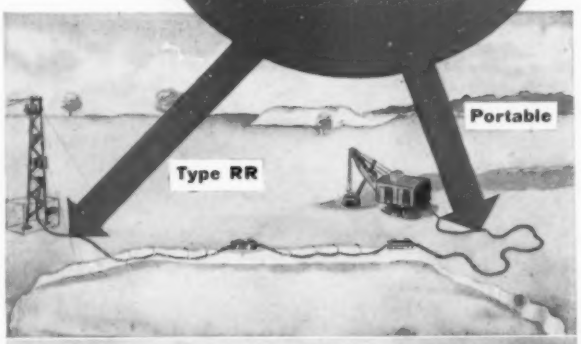
Tellurium, Type RR—Such a trend is the use of all-rubber (RR) instead of metallic-armored cable. One reason this can be done is tellurium—a 60-per-cent rubber compound that's tough. While best known as the over-all sheath on portable cable, tellurium has other excellent properties that fit it for use on "parkway" cable.

Used here from pole to junction box—and between boxes—this RR cable saved in several ways. Yet the line is well protected against lightning and abuse.

Being nonmetallic, RR cable is easy to install: it is light and easy to move. First cost is low, yet records have proved that this cable will give long years of service.

Tellurium, Portable—This type runs to the shovel from either junction box. It has copper shields and ground wires that provide a low-resistance ground return and make it the safest type of portable cable for electric shovels.

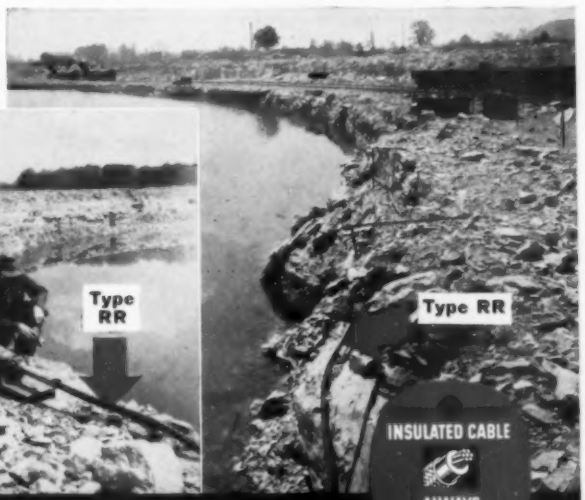
New Ways to Save—Any such job deserves study to select the type of cable best suited for every circuit. In this work, a G-E cable specialist can help—and will be glad to. He may be able to show you new ways to save. Reach him through a G-E jobber or a G-E sales office, or address General Electric, Dept. 6-201, Schenectady, N. Y.



Drawing at top shows how Type RR tellurium cable runs from pole along ledge to junction box; tellurium portable, from 2nd box to shovel.

The Type RR is a 3-conductor, 5000-volt, shielded cable, with duck tape over-all. The portable cable is a Type SH Class D, shielded, with ground wires.

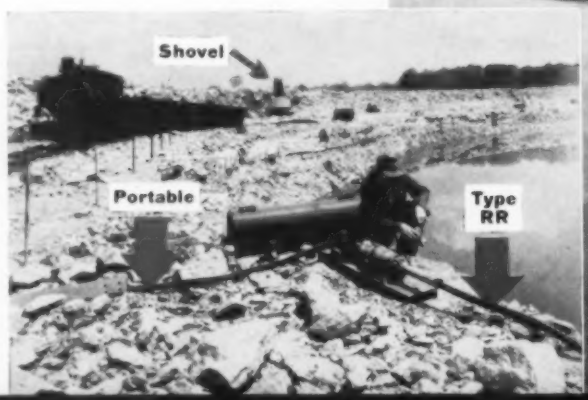
Pictures show views of both types of tellurium-rubber cable in this quarry of the Louisville Cement Corp.



OTHER USES

Type RR—Buried in ground . . . run on ground or overhead . . . in mines, on floor or wall or down bore holes . . . any "parkway" use. For this nonhygroscopic tellurium-rubber sheath, call for R-8331.

Portable—For cutting machines, loading machines, dredges, drills, reel locomotives, arc welders, portable pumps. For this tellurium-rubber sheath, call for R-387.

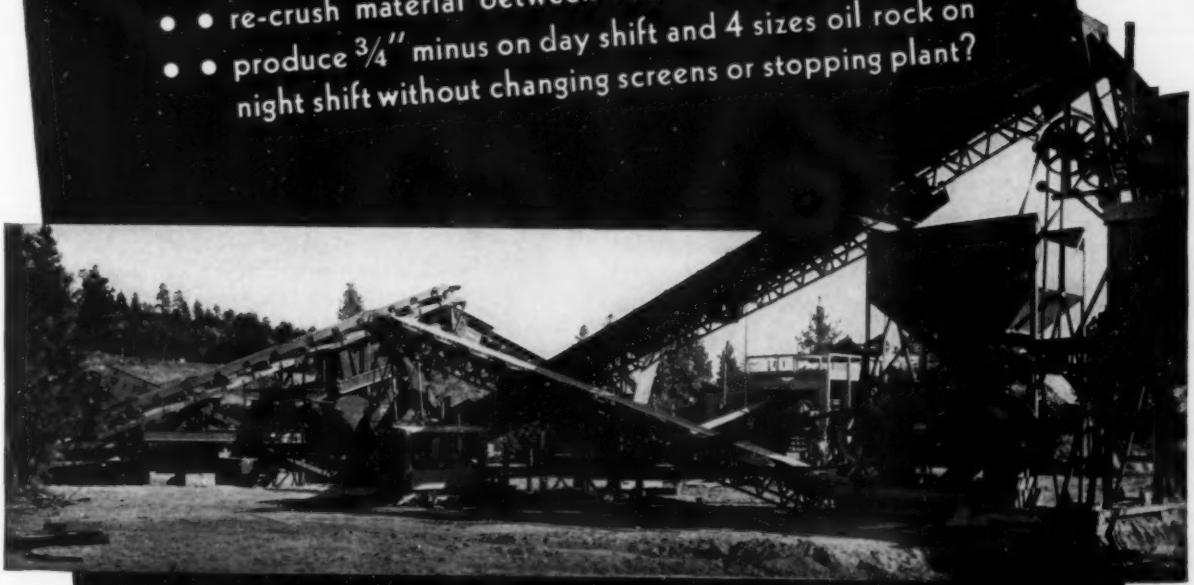


GENERAL ELECTRIC

520 136

CAN YOU . . .

- • produce 6 sizes crushed rock?
- • control the quantities of each size product?
- • re-crush material between 1¼" — 2" to finer sizes?
- • produce ¾" minus on day shift and 4 sizes oil rock on night shift without changing screens or stopping plant?



HERE'S HOW McNUTT BROS. of Eugene, Oregon do it.

They use a Pioneer 24"x36" Primary Jaw Crusher fed with a traveling grizzly — A 30" Feeder Conveyor to a 54 V Plant with 4'x12' Vibrator Screen — 54"x24" Roll Crusher — Return Belt Conveyor System — 30" - 70 ft. Delivery Conveyor to a 4'x24' Vibrator Screen mounted over 5 compartment bin—Return Conveyor carrying any excess from bin to 40"x22" Roll Crusher —Return Conveyor from Roll Crusher to either 54 V Plant or to vibrating screen on bin. 24" chip conveyor from 54 V Plant to separate storage bin. Plant powered by 2 D-13000 and 1 D-17000 Pioneer Caterpillar Power Units.

Pioneer will appreciate the opportunity of working with you on your rock problem.

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APR 11 1939

Rock Products

With which has been consolidated the journals

CEMENT and ENGINEERING NEWS — Founded 1896

CONCRETE PRODUCTS — Est. 1918

Recognized the World Over as the Leader in Its Field

VOL. 42 CHICAGO, APRIL, 1939 No. 4

CONTENTS

Debt and Taxes—*Nathan C. Rockwood* 33

Deleterious materials—Pennsylvania aggregate producers find ways to meet higher quality standards—*Bror Nordberg* 34

Modern wet process plant replaces "dry" mill—second article—*C. D. Rugen* 37

Produce two sand sizes on Diesel-electric dredge—*Bror Nordberg* ... 41

Quarry methods used in sand and gravel pit—*Nathan C. Rockwood* .. 44

Crushing, sizing, testing and specifying aggregates—Part I—introducing the author and his theme—*Elwood T. Nettleton* 45

Selecting lubricants for efficient service—*Bror Nordberg* 47

The plant superintendent—adequate recognition not being given lime plant superintendents—*Victor J. Azbe* 49

Results of the latest study of the phase composition of cement clinker—Part 7—*L. A. Dahl* 50

Preventing kiln troubles by finding the cause—Part 4—*W. S. Dickie* .. 54

Experts talk lime—*Nathan C. Rockwood* 56

Practical programs asked—John J. Early, concrete craftsman extraordinary, addresses American Concrete Institute 58

Moisture-proof block—asphalt-dipped unit designed to keep out water 67

Sell more ready-mixed—special handling equipment and planning the job increases profits—*H. F. Thomson* 68

Concrete Silo Staves—*Bror Nordberg* 71

Drainage and irrigation topics at "Frisco" pipe convention 72

Placing glaze finish on colored concrete units 73

Mass production methods of pipe manufacture 75

Concrete burial vault makers show progress—*R. W. Mead* 77

New equipment and products 78

Departments

Classified directory of Advertisers 98

Concrete Products 65

Editorial Comments 33

Hints and Helps 60

Index to Advertisers 118

New Machinery and Equipment 90

News of the Industry 94

News of the Month 82

Personalities 62

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ROCK PRODUCTS
Bears the Twin Hall-Marks of Known Value

Impartial measurement of reader interest in terms of paid circulation

Authentic facts relating to editorial scope and readership analysis

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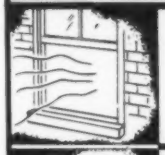
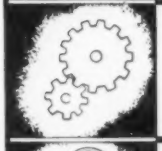
✓ Check this chart and check your losses!



☐ **WASTED MATERIALS**
Dust, when of intrinsic value, represents waste unless it is salvaged



☐ **MACHINERY REPAIRS**
Dust is abrasive, increases wear and tear in machinery

☐ **SHUT-DOWNS**
Dust causes damages which may entail highly expensive stoppages

☐ **HIGH LIGHTING BILLS**
Dust reduces visibility, necessitates higher wattage

☐ **SUB-STANDARD PRODUCTS**
Dust impairs the work of precision machines, affects many operations

☐ **REDUCED WORKING EFFICIENCY** Dust lowers morale, slows up the working pace

☐ **EXTRA CLEAN-UP EXPENSE**
Dust spreads throughout the plant, makes cleaning harder and more frequent

Efficient DUST CONTROL

Put a stop to the losses that dust causes when it is not efficiently controlled. Halt the daily raid on your profits.

Not all of the elements of loss which are attributable to dust appear in the chart here. And not all of them, perhaps, apply in your case. But by and large, throughout industry, the losses chargeable to uncontrolled dust are huge.

You are sure to effect significant savings for your company by *efficient* dust control. We stress the "efficient" advisedly, for dust collection systems vary widely in performance and in cost.

Write for our *Bulletin D81*. It explains dust collection principles clearly, helps you size up your own needs—and is free to any managing executive or operating engineer.

BUELL ENGINEERING COMPANY INC
Suite 5000, 2 Cedar Street, New York

Buell Dust Collectors are engineered individually to meet the requirements of each specific job. They are the *only* collectors which bring you the combination of high extraction efficiency and low operating costs which the patented Van Tongeren design ensures. Maintenance costs are so slight as to be negligible. Operating costs are practically nil.

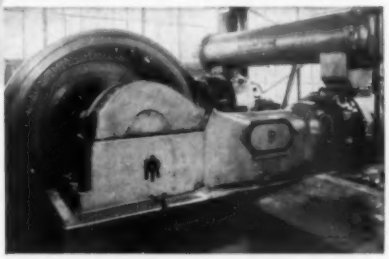
buell
DUST COLLECTORS

If you have a SMOKE problem ask also for *Fly Ash Booklet A93*, which gives all the essential facts in the fewest possible words, with the help of theory-at-a-glance illustrations.

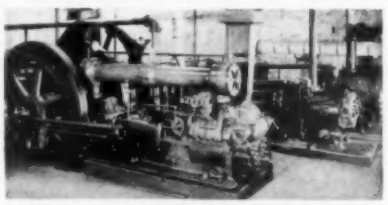
SALES OFFICES IN PRINCIPAL CITIES

NO QUANDARY IN THIS QUARRY

ALL AIR TOOLS at this quarry are lubricated by Texaco. More footage per shift is one result of Texaco Perfected Lubrication.



TWO STAGE Ingersoll Rand compressor. The cylinders are lubricated with Texaco Ursa Oil.



SULLIVAN AIR COMPRESSOR at this granite quarry is Texaco lubricated...has been for years.

NEW! Texaco's 36-page Rock Drill Booklet. Shows various types, how to lubricate them to keep them on the job. It's yours for the asking.

THIS BIG SOUTHERN GRANITE QUARRY knows just how to keep compressors working efficiently, drills and saws making footage. The operators report reduced maintenance and low lubrication costs.

For more than 7 years, all equipment here has been lubricated with Texaco.

Texaco Alcaid, Algol, and Ursa Oils keep compressors free from gummy deposits, valves seating properly, lines open. For similar results with your equipment, call the nearest of our 2229 warehouses, or write direct. A Texaco trained lubrication engineer will advise what Texaco Lubricant to use, whatever the need.

The Texas Company, 135 East 42nd St., New York.

Texaco Dealers invite you to tune in The Texaco Star Theatre—a full hour of all-star entertainment—Every Wednesday Night—Columbia Network—9:00 E.S.T., 8:00 C.S.T., 7:00 M.S.T., 6:00 P.S.T.

TEXACO Alcaid • Algol • Ursa Oils

PERFECTED LUBRICATION FOR COMPRESSORS

What! Steel Cheaper than Wood ?

YOU may be one of the many who think of timber as the cheapest material for building belt conveyor frames, and it was not so long ago that this was true. But now—it is hard to find a conveyor installation that would not be cheaper with the new Barber-Greene Standardized Conveyor Truss.

The B-G Truss is Pre-Engineered. You get the truss to support a given load for a given span or overhang.

It is shipped from stock—no costly delays.

It can be erected in a fraction of the time required for building a timber truss—and with less expensive labor.

Since much longer spans are possible, fewer bents are needed, not only saving the cost—but avoiding unnecessary ground obstructions.

The upkeep of a B-G Standardized Steel Truss Conveyor is much less than a wood frame. There is no sagging, rotting, or warping, and no fire hazard.

The belt life is greatly prolonged because the B-G steel frame is correctly aligned and retains this alignment.

All the idlers may be easily reached for lubrication and alignment. This is particularly important on the return belt idlers, which are very inaccessible in most timber frame construction.

The decking in timber conveyors is usually flat, allowing the material to build up and stop the idlers. Curved (self-shedding) decking is furnished with the B-G Truss.

Your Barber-Greene can never be made obsolete in your material handling system. It can be lengthened, shortened, or otherwise altered to meet changing conditions, or new set-ups. It is built to take all standard B-G conveyor parts and accessories. For the same reason, there is always a high resale value on Barber-Greenes—much greater than the small salvage value of a timber frame conveyor.

A B-G representative will gladly call to discuss YOUR material handling problems. There is no obligation.

BARBER-GREENE COMPANY

459 West Park Ave. Aurora, Ill.

KOEHRING

Wheeler method
Moves Dirt • Faster • Cheaper

KOEHRING HEAVY-DUTY

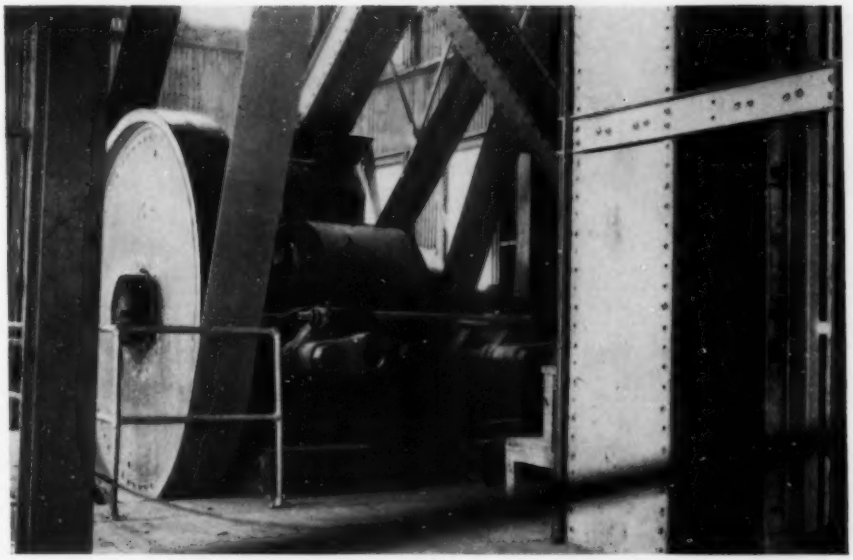
Loads of power to load — exceptionally high speed for travelling — Push tractor applies power where needed, *behind* the cutting blade. High speed, time-tested job-proven Koehring Tractor hauls the Wheeler to and from the dump. Write for information about costs and production of *This Newest Method— The Koehring Wheeler Method*

KOEHRING COMPANY
MILWAUKEE • WISCONSIN

HEAVY-DUTY CONSTRUCTION EQUIPMENT

Extra Profits for You - - -

Agricultural Lime can be made economically from Limestone fines with



TRAYLOR
CRUSHING ROLLS

Crushing rolls have long been recognized as producing fine ground material at the lowest cost per ton of any type of crushing machine, when the feed is such as can be handled by rolls, and for many years these machines have been used in a large number of different industries in such service.

Traylor Crushing Rolls have been built in several types and many sizes for more than thirty years, and are now in daily use in practically every civilized country in the world crushing most of the known varieties of ore and rock.

Traylor Rolls will crush to as fine as 20 mesh and are, therefore, particularly adapted to the use of limestone operators desiring to make agricultural limestone from their otherwise nearly worthless fines screened out of commercial crushed stone.

Installation of one of these machines is not particularly expensive and, therefore, it will pay you to investigate this source of potential extra profits. Write today asking for our Bulletin 3627 or to have our man around for a talk!

WE BUILD

Rotary Kilns
Rotary Coolers
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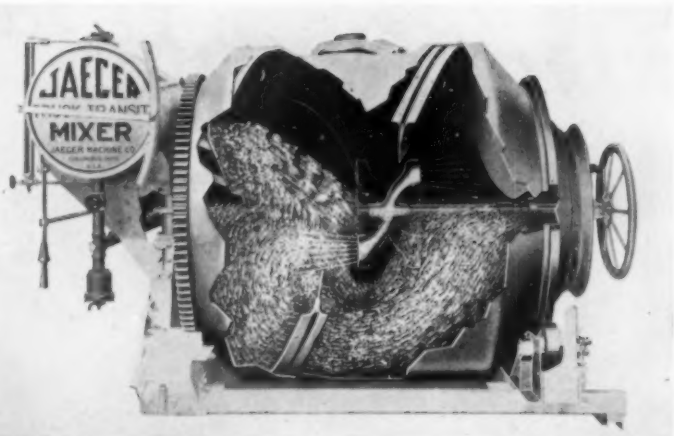
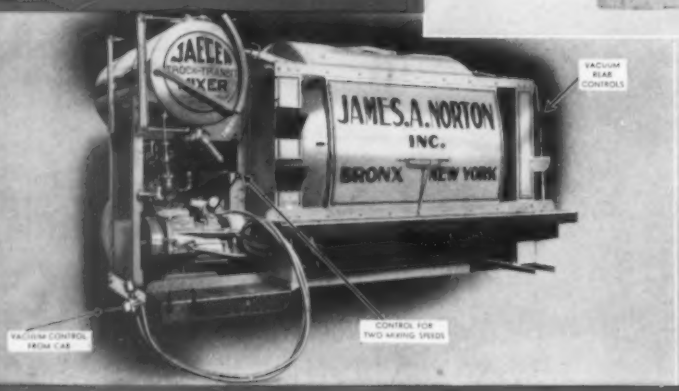
VACUUM CONTROLS —DUAL REVOLVING WATER SPRAYS— SYPHO-METER WATER TANK—

Be Sure Your New Mixers Have Them!





JAEGER VACUUM CONTROLS OPERATE FROM CAB

The touch of a foot against the lever starts or stops drum. No effort, no leaning out of cab and no distraction from driving! Safe, Simple, Convenient!

JAEGER, Alone, Builds This

ECONOMICAL TRUCK ENGINE DRIVE WITH VACUUM CAB CONTROLS:

New model truck engines have ample power to operate Jaeger Truck Mixers thru simple power take-off—with mixer ***vacuum controlled from cab by foot lever!*** Simple, easy, safe in traffic—a Jaeger 1939 improvement.

We also furnish Jaeger Truck Mixers with separate engine drive which can be mounted on any truck, old or new.

ACCURATE WATER CONTROL UNDER ALL CONDITIONS - - Plus 100% Faster Distribution

Jaeger Sypho-Meter Water Tank with "Accuracy Chamber" insures accuracy of measurement no matter how long the haul, how rough the road, or how violently water splashes in the tank. Jaeger Dual Revolving Sprays clear path in material as they revolve, spray over and into mass in both directions, from end to end of drum, insure new speed and uniformity of water distribution. Demand these 1939 improvements.

REVERSING END-TO-END "RE"-MIX PRODUCES QUALITY CONCRETE:

No other truck mixer offers this speed and uniformity of water distribution combined with Jaeger's exclusive combination of Dual Mixing Speeds, Double Drum Cones, Continuous Spiral Mixing Blades and Throw-Back Reversing Blades—for mixing higher strength concrete—for discharging it in one fast, clean, continuous pour, without segregation. Jaeger Truck-Mixed Concrete is recognized higher strength, preferred by architects and engineers.

FLASH! NEW YORK ORDERS $225,000 WORTH OF JAEGERS IN PAST 60 DAYS:

These Big Operators Are Standardizing on Jaeger Truck Engine Drive Units with Vacuum Cab Controls

1 — 1½ — 2 — 3 — 4 — 5 — 6 CUBIC YARD SIZES

Modern Truck Mixer

As building activity increases, the sale of ready-mixed concrete is rapidly replacing bulk materials as a profitable business.

In this expansion, Jaeger more than ever takes the lead—with basic improvements in water measurement and distribution and Vacuum Cab Controls—features found in no other truck mixer—features originated by Jaeger just as Jaeger originated the modern, 3-point mounted, Double-End Cone, Self-Cleaning Drum with Throw-Back Reversing Blades, that produces higher strength concrete, mixed end-to-end and discharged in mass.

Today, alert business men who have seen the opportunity and studied the methods of successful operators, are buying Jaeger Truck Mixers. THERE ARE MORE JAEGER TRUCK MIXERS AND AGITATORS IN USE TODAY THAN ALL OTHER MAKES COMBINED.

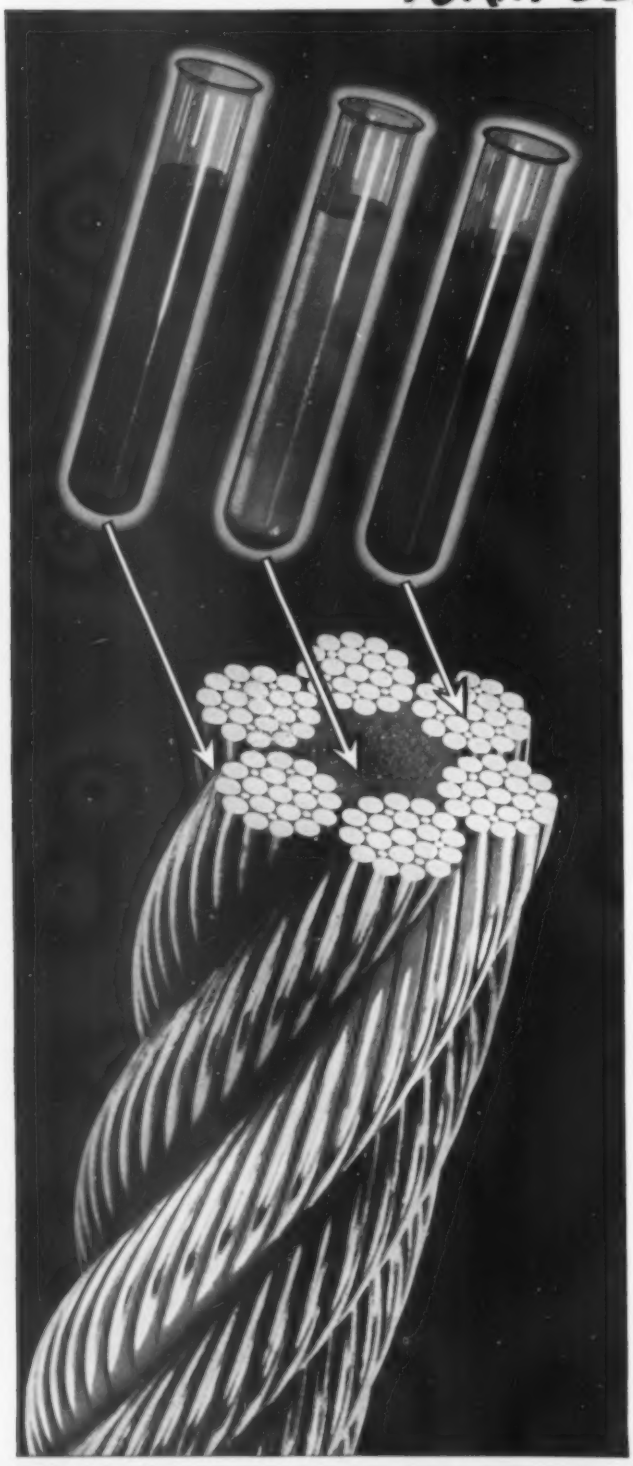
THE JAEGER MACHINE CO., Columbus, Ohio

SEND FOR YOUR COPY— NEW 68-PAGE DATA BOOK FOR READY-MIXED PLANTS JUST OFF THE PRESS!

Whether you are already operating a ready-mixed plant or planning to start one, you will find this book an invaluable guide and reference on modern truck mixer and agitator operation, compiled by the world's largest manufacturer—up-to-date, authoritative, complete.

THE JAEGER MACHINE COMPANY
603 Dublin Avenue, Columbus, Ohio
Gentlemen:
We are interested in 1939 data on Ready Mixed Plants with Truck Mixers and Agitators, including set-up, operation, maintenance costs, selling of strength concrete, etc., as well as new developments in mixer design.
Name _____
Address _____

PURPLE-STRAND *FORM-SET* WIRE ROPE



3 lubricants scientifically compounded

IN wire rope, proper lubrication of every part is essential to longer life. Only in this way can internal friction be cut down and the closely fitted, precision-made parts protected against corrosion and destructive internal wear.

But ordinary oil or grease cannot serve in heavy-duty rope. Nor could a single type of oil properly lubricate the 100 to 400 moving parts of a line. To overcome these conditions, Bethlehem uses three different lubricants. Each one is specifically compounded for a section of this type of cable. One lubricant keeps the hemp in the core soft and pliable. A second, used for the strands, stays in this compact group of wires and gives them lifetime protection. A third is compounded for the rope as a whole and is built in while the strands are brought together. It serves to seal out moisture and minimize friction between strands as they twist, bend and slide under bending and load.

This special, built-in lubrication is one of many reasons why Purple-Strand Form-Set is so satisfactory in service. A precision method of drawing wire is another. The use of only premium-priced steel is a third. In every detail, Purple-Strand quality is the result of long study, precision design and careful workmanship. Equally important is the fact that every step in the manufacturing process is under the supervision and control of one integrated organization.

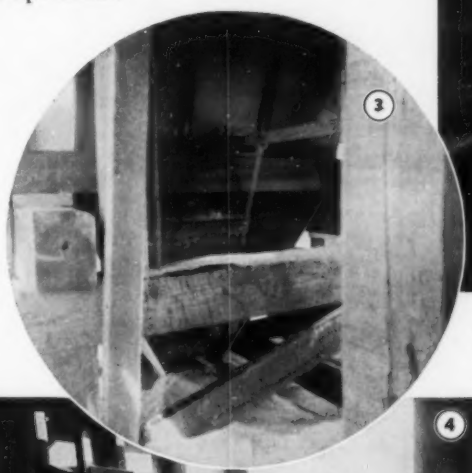
BETHLEHEM STEEL COMPANY

IT'S TELSMITH EQUIPMENT

AT THE TUSKEGEE SAND AND GRAVEL COMPANY PLANT

● This modern, all-electric powered plant of the Tuskegee Sand & Gravel Co., Tuskegee, Ala., is a fine example of both Telsmith equipment and Telsmith engineering service. The Tuskegee gravel washing plant, started early in 1938, is turning out 125 tons per hour, 30 per cent of which is pumped. Its five bins have a total capacity of 400 tons.

Gravel from the pit is hauled ¼ mile to the plant in 5-yd. side-dump cars, dumped into a 30-yd. hopper, and fed by a Telsmith Plate Feeder to a belt conveyor, which discharges to a 4 x 12-ft. Telsmith Four-Deck Pulsator driven by a 10-hp. motor.



1—*General view of plant from feed hopper.*
2—*4' x 12' Telsmith four-deck Pulsator.*
3—*No. 8 Telsmith Sand Tank.*
4—*No. 32-B Telsmith Reduction Crusher.*

Material is washed over this Telsmith vibrating screen under pressure; 900 g.p.m. of wash water being delivered by a motor-driven pump. Three sizes of gravel are produced. "Throughs" from its sand deck are flumed to a No. 8 Telsmith Sand Tank. With two sets of interchangeable screen trays, either concrete or mortar sand is recovered, as desired.

Oversize gravel from the screen goes to a bin with a slide gate which passes it right into the crusher. Working at choke feed, the No. 32 Telsmith Reduction Crusher takes it as fast as it comes—discharges to portable belt conveyor which loads it into railway cars. Using a 40-hp. motor with V-Belt drive, this Telsmith Crusher is very economical of power.

Telsmith designs and equips complete gravel pit and quarry plants . . . stationary, semi-portable or portable . . . exactly to fit *your* needs. High-grade equipment, sound engineering and centralized responsibility assure satisfaction to the buyer. *Write for Bulletin G-11.* GC-5-39

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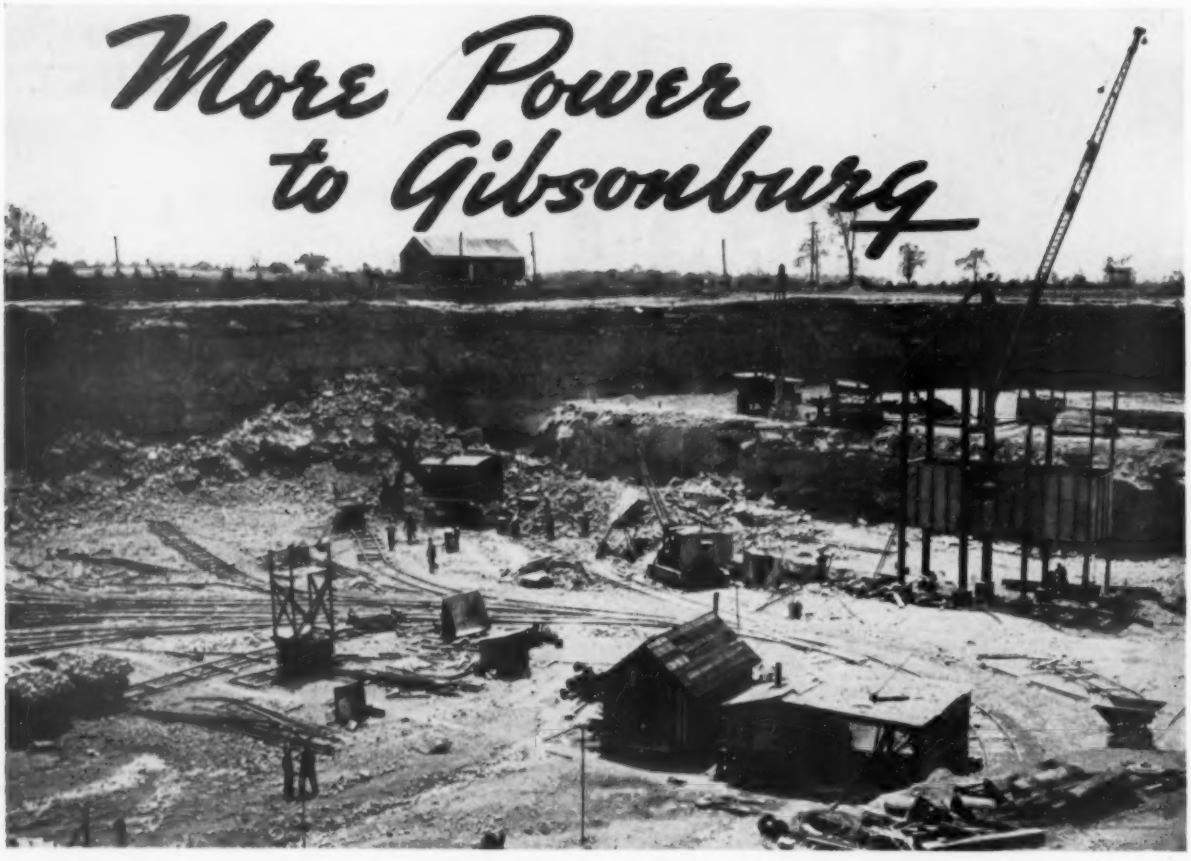
TELSMITH



...AND MORE IMPORTANT—CHEAPER POWER

● The 8 cylinder 12½ x 16½, 615 hp SUPERIOR DIESEL that the Gibsonburg Lime Products Company, of Gibsonburg, Ohio, has just purchased will give them the low cost power so desirable in quarries and rock crushing plants today.

This same economy is likewise available to you. Let our engineers analyze your problem; their service is free.

THE NATIONAL SUPPLY COMPANY . . . SUPERIOR ENGINE DIVISION

FACTORIES: Springfield, Ohio; Philadelphia, Pa. · SALES OFFICES: Springfield, Ohio; Philadelphia, Pa.; New York, N. Y.; Los Angeles, Calif.; Houston, Texas.

LORAIN Scoops THE Field

with the NEW LORAIN-79

1½-YD. SHOVEL
25-TON CRANE

FEATURING

ALL-WELDED SHOVEL BOOM

Here's the strongest boom ever placed on a Lorain machine—a 23' all-welded boom of entirely new construction. Its Center Drive design makes for greater ranges, too, as proved by the fact that the Lorain-79 can dig practically 29' high with boom at 50°.

DOUBLE CENTER DRIVE TURNTABLE

And we do mean "double." Improved Center Drive design uses double pinion to send a greater flow of power into the hoist shaft equipped with bigger drums and more cable capacity. Add to this simplicity of construction and direct application of power and there's your answer to a turntable design that can really give and take.

CENTER "CHAIN" DRIVE CRAWLER

It's longer, wider, heavier, stronger—yet the 2-speed Center "Chain" Drive Crawler moves the 1½-yd. Lorain-79 around with the agility of a ⅜-yd. unit. It will roll this 87,000-lb. machine right up a 30% grade—travels or steers in either direction. Watch it perform and you'll agree it has everything you ever wanted in a crawler—and then some.

For the complete story (and it's a good one) on the Lorain-79, write today for new catalog.

1 2 3

Plus

- Automatic Power Dipper Trip
- Automatic Crowd Brake
- All-Welded Dipper Stick
- Crawler Travel and Safety Lock
- Rustproof Tread Adjustment
- Two-piece Swing Drums with Reversible Clutch Bands
- Simultaneous Hoist . . . Swing and Travel

THEW CENTER DRIVE

THE THEW SHOVEL COMPANY LORAIN, OHIO

CUT OPERATING COSTS!

Progressive Operators Modernize with Allis-Chalmers Equipment! Read How You Can Improve Your Product...Lower Your Power and Maintenance Costs . . . with the Equipment that Pays for Itself!

Today every crushing plant operator is confronted with the task of showing a profit in the face of rising costs of production.

That looks like a tough job . . . but that's what progressive operators are doing . . . and they're doing it with modern Allis-Chalmers equipment . . . equipment that cuts their operating costs to a minimum!

Actually it costs nothing to modernize! The improved product . . . the continuous production . . . the lower power and maintenance costs that modern equipment brings . . . more than pay for the initial investment in an amazingly short time! That's what you get when you specify Allis-Chalmers!

But that's only a part of the story! For back of every piece of equipment that you buy stands Allis-Chalmers' 90 years of engineering experience. And that 90 years of engineering superiority works for you whenever you place an order!

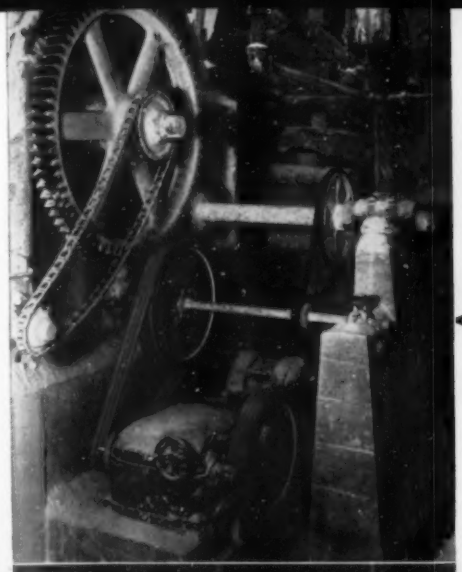
Undivided Responsibility!

Remember, too . . . Allis-Chalmers is the only company in the world that can completely equip your plant — crushers, screens, grizzlies, hoists, elevators, feeders, washers, dryers, pumps, motors, and Texrope Drives — all made by one company . . . all up-to-the-minute, cost-cutting equipment! Allis-Chalmers accepts the undivided responsibility for mechanical operation that means increased over-all efficiency for you!

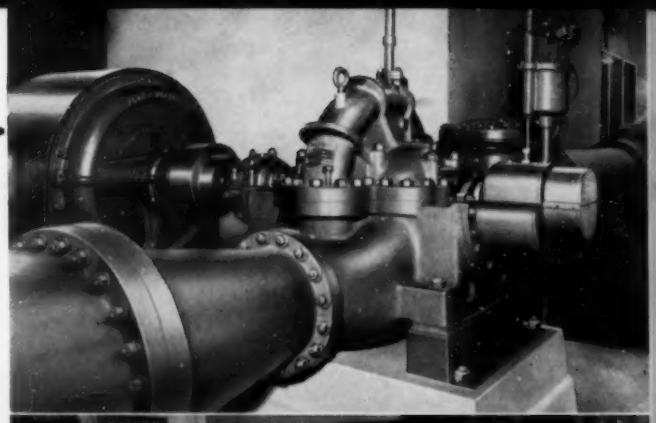
For the full story on how Allis-Chalmers can help you . . . give you an improved product at lower operating costs . . . telephone the nearest district office or write direct to Allis-Chalmers, Milwaukee.

1069

90 Years of Engineering Superiority Work for You When You Specify Allis-Chalmers!

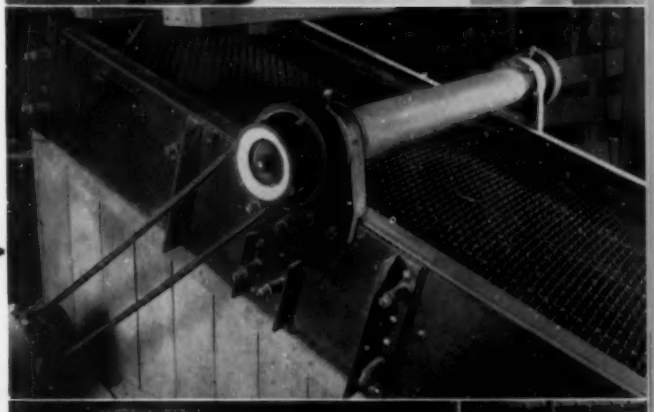


COMPLETE UNIT of Allis-Chalmers Pumps and Lo-Maintenance Motor delivers higher capacities at lower cost in this southern plant.



• • •

MORE EFFICIENT variable speed transmission at lower power and maintenance cost is delivered by this installation consisting of the sensational new Allis-Chalmers Vari-Pitch Speed Changer, Lo-Maintenance Motor and Texrope Drives, operating a rotary dryer. Note the dusty operating conditions.



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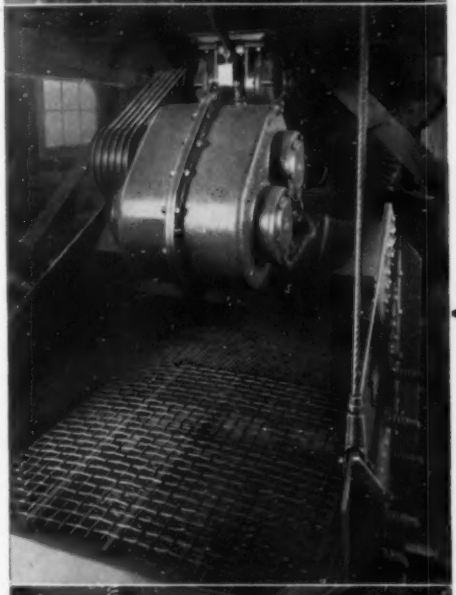
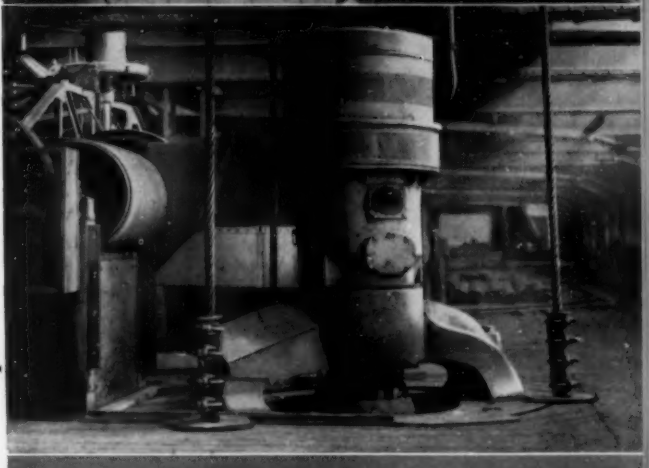


FOR LOW COST screening of fine material, the Allis-Chalmers Aero-Vibe Screen can't be beat, according to the owner of this small mid-western stone company.

• • •

LOW MAINTENANCE operation plus cleaner separations and reduced space requirements make this installation of a Double Deck, Low Head Vibrating Screen, Lo-Maintenance Motor, and Texrope Drives ideal for this sand and gravel company.



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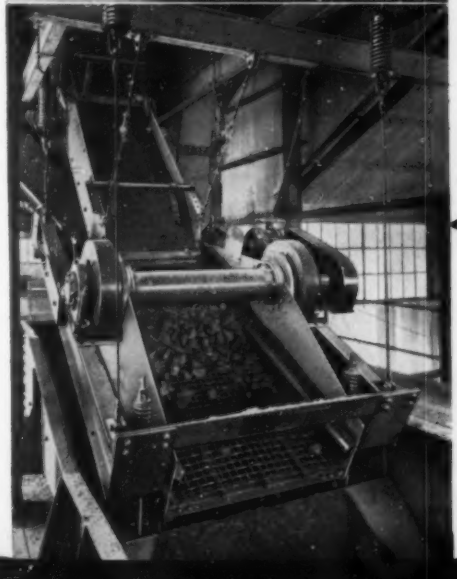
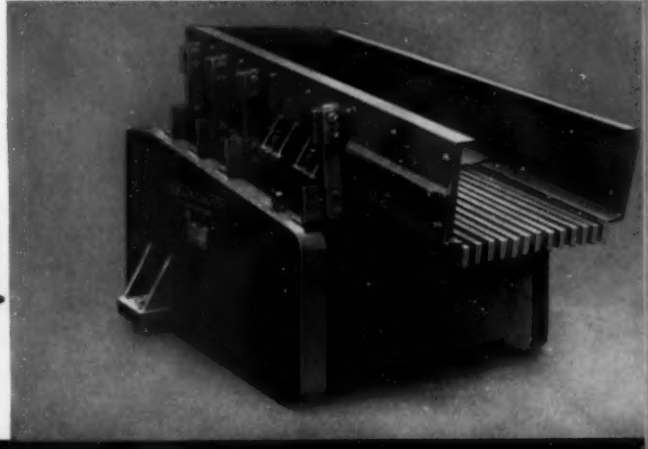


HIGH SPEED Newhouse Gyratory Crusher gives this far western crushing plant a uniform, cubical product at low operating costs.

• • •

HEAVY DUTY Style "B" Double Deck Centrifugal Vibrating Screen handles heavy loads of large stone for this South African crushing plant.



• • •

UNIFORM FEEDING . . . for both speed and texture . . . is the result of this combination of an Electro-Magnetic Vibrating Dryer and Suspended Grizzly.

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examine it with your problems and requirements in Mind!

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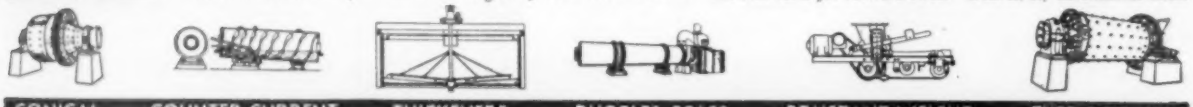

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This job's as good as done. We're using Hercules!

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FROM THE DAILY REPORT OF A
TIGER BRAND WIRE ROPE ENGINEER

"You're just the man I'm looking for," says the foreman when I walked in here this morning. He has been keeping service records on wire rope, and lately, performance has been falling off. He wanted to know whether he should try a new construction or a new grade.

"How long since you've regrooved those sheaves?" I asked. Nobody even remembered when they had been last regrooved!

Sure enough, that's where the trouble lay. The grooves had worn down so that the proper size gage nowhere near bottomed. Also they were badly scored. Now they're regrooving, and I'll bet you a hat the rope will last twice as long.

Yours,

al

— HOW LONG SINCE YOU'VE REGROOVED THAT SHEAVE?

TO get maximum rope life on your equipment, be sure to check grooves in sheaves and drums at regular intervals for size, contour, and depth. Such inspections are especially important when new wire ropes are to be installed.

Sheaves, drums, and wire ropes are moving parts, subject to wear. Rope travel causes groove wear. Consequently, as rope diameter decreases, grooves become deeper and narrower. Putting a new full-diameter rope in worn grooves causes a binding action that invariably deforms the rope, and cuts short its useful life.

Groove contours should also be inspected periodically for uneven wear, a condition which causes vibration, noisy operation, and generally poor service.

Whenever you find sheaves and drums which show evidence of excessive or uneven wear, regroove them. It will pay you big dividends in longer rope life and all-round better operation. Don't let worn grooves rob you of the performance you can expect from good wire rope.

USS
EXCELLAY
Preformed
WIRE ROPE

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York
COLUMBIA STEEL COMPANY
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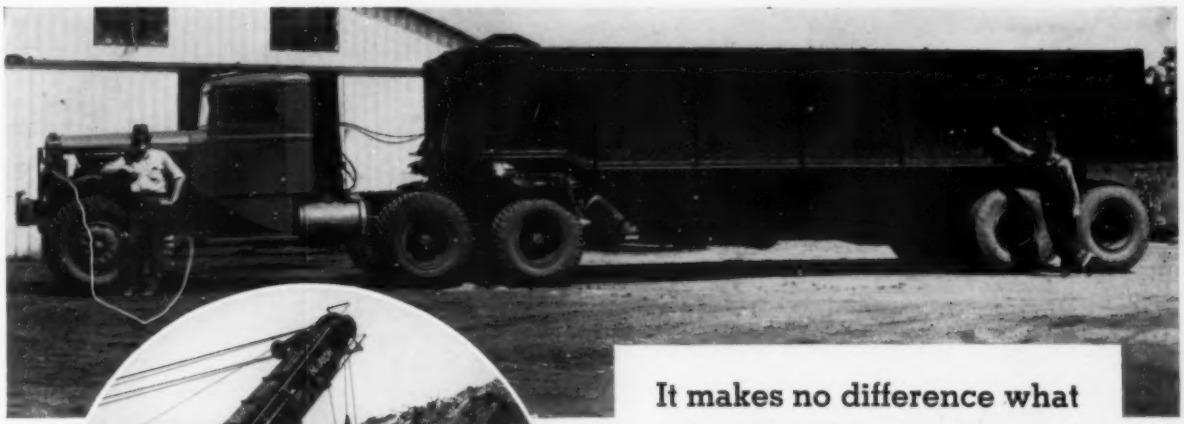
United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

Is It BIG CAPACITY Trailers You Want?



It makes no difference what capacity you want. Sanford-Day will build them to meet your requirements—from 6 tons up . . . and with advantages that only Sanford-Day can offer you.

● S-D "Automatic" Trailers mean savings to you where the greatest of savings are possible. Check up on your haulage and dumping cost. Check especially on your cost of dumping, for S-D Trailers are "Automatic"; and, in addition, the simplest, fastest, most fool-proof and economical trailer you can use.

Here is the trailer that eliminates all auxiliarly powered dumping mechanisms—Result: simplicity and low upkeep expense! Sanford-Day's nationally known mine car principle of automatic bottom discharge is the feature of this trailer. Doors are tripped and closed automatically by the simple forward movement of the trailer. No manual labor whatsoever. With a continuous circuit of hauling—never stopping when discharging . . . with the maximum capacity available for given over-all dimensions . . . with doors swinging below top of bin when in discharge position, permitting a very low center of gravity and extreme low over-all height, S-D Automatic Bottom Discharge Trailers will save time . . . at production speeds you never thought possible. Built for Strip Mines, Cement, Sand, Gravel, and other operations, in capacities to suit your individual requirements. Clip the convenient memo at right and mail NOW.

MAIL THIS MEMO NOW

Sanford-Day Iron Wks., Knoxville, Tenn.

Furnish us with your completely illustrated "Increase Production—Lower Cost" story on the S-D Automatic Bottom Discharge Trailer.

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705 Dale Ave., Knoxville, Tenn., U.S.A.

MINE CARS, ALL TYPES • TRAILERS • WHEELS • SHEAVES

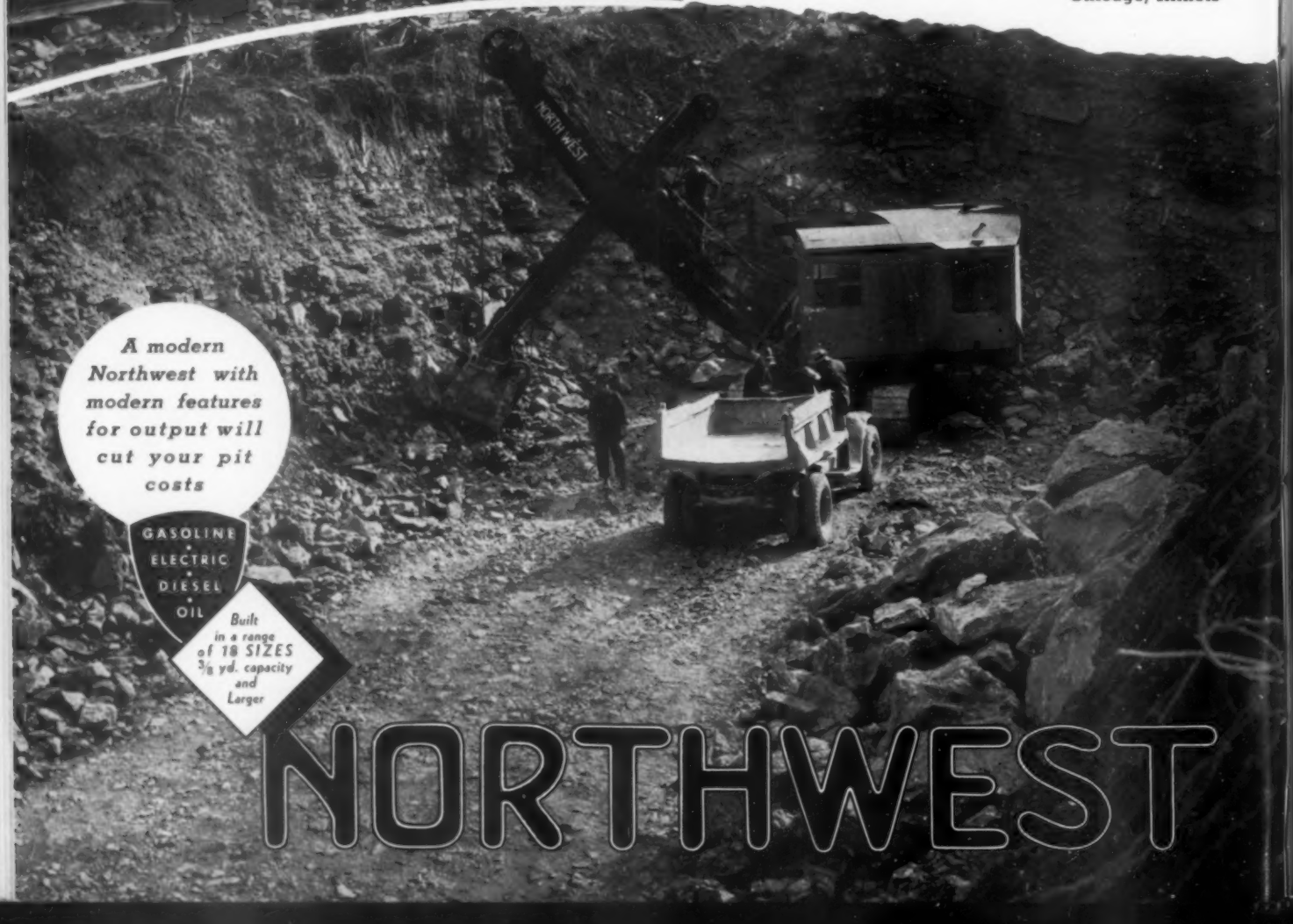
BURNING MONEY!

THIRTY years old and still working! A grand old testimonial to the quality that our forefathers built into machinery—but a clattering, spark-spitting testimonial to inefficiency and costly operation. Every time it's stoked up it's like shoveling money into the fire.

Operators that continue production with relics like this because it owes them nothing on the original investment are kidding themselves. Today a 3/4 yd. Northwest that can swing in the length of that old cab can equal its output without the cost that comes with coal, banking fires, getting up steam, pumping and piping water, to say nothing of all the other troubles like moving delays, packing troubles, water troubles, boiler tube troubles and the cost of baling wire to hold it together.

You can cut your costs with a modern Northwest Shovel. Ask for details.

NORTHWEST ENGINEERING CO.
1820 Steger Building, 28 East Jackson Boulevard
Chicago, Illinois



A modern Northwest with modern features for output will cut your pit costs

GASOLINE • ELECTRIC • DIESEL • OIL

Built in a range of 18 SIZES 3/8 yd. capacity and Larger

NORTHWEST

Here is that NEW CRUSHER you have been waiting for

Makes a more cubical and desirable product

Here is the crusher that fills a long felt need, especially by those faced with the task of making a product to meet today's specifications from a material which has a tendency to break slabby. With its different crushing action, more cubical shaped particles are produced than with any other type of crusher where crushing is done by impact. This superior product brings a premium price in any market.

Another feature of the Symons Impact Crusher, and one which appeals to producers of crushed materials, is its flexibility. It readily fits into the average crushing plant and provides a wide variety of products, from sand to the intermediate sizes. It also makes more of those extremely fine sizes so often required for blending in order to give the proper gradation as required in the newer specifications.

Each fine crushing job has its own particular problems. In some instances, an Impact Crusher may be preferable; for other jobs, the Symons Cone Crusher. As builders of both machines, Nordberg is in a position to aid in the solution of your fine crushing problems.

NORDBERG MFG. CO. MILWAUKEE WISCONSIN

SYMONS IMPACT CRUSHER

THIS ISSUE MARKS
THE BEGINNING OF

ROCK PRODUCTS

37th

YEAR

OF HELPING PRODUCERS MAKE
MORE PROFITS AND OF CREATING
GREATER SALES FOR EQUIPMENT
MANUFACTURERS

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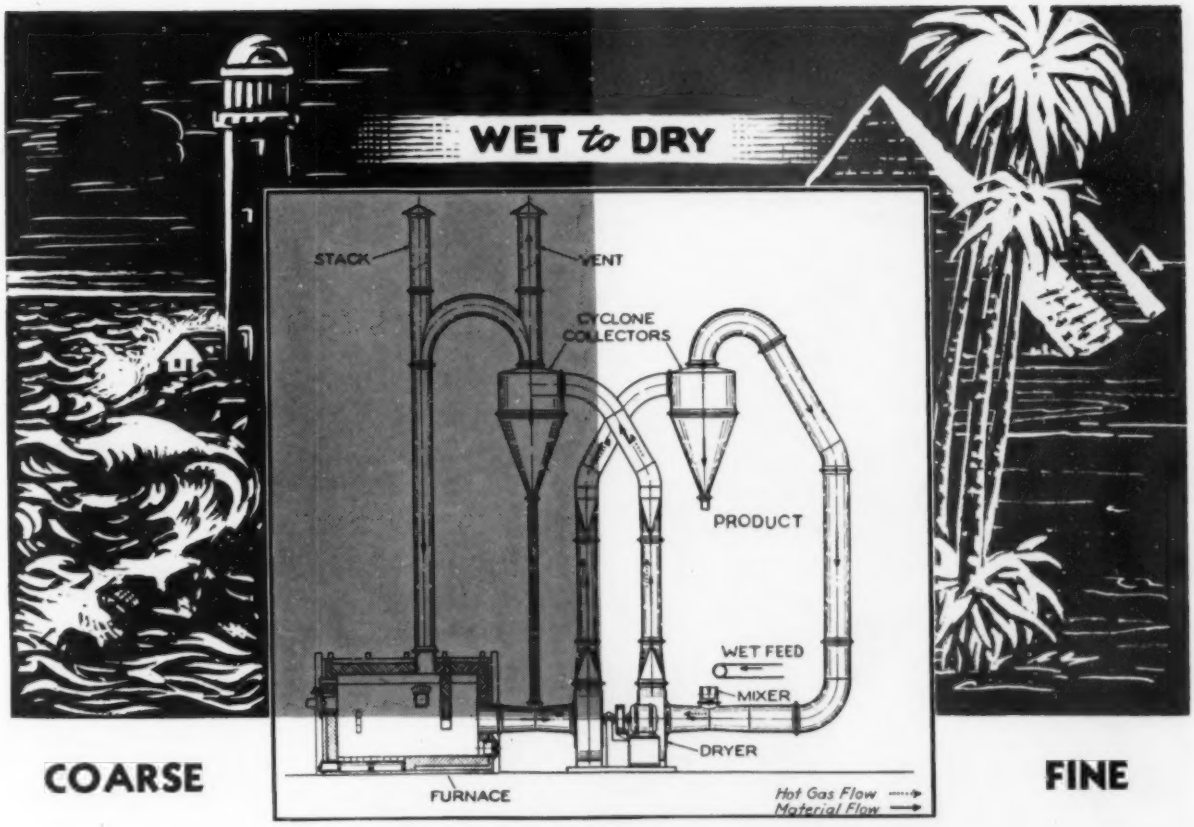

RAYMOND
FLASH DRYING

Producers with special drying problems are finding a simple and economical solution in the Raymond Flash Drying System. This gives fast, automatic drying where the finished product must be delivered in powdered form.

Compact equipment . . . a single, continuous operation . . . and close control over the product . . . are features of the Raymond System.

In a recent installation for a clay processing plant, Flash Drying is used in conjunction with a special Imp Kiln Mill equipped with a whizzer separator for the production of kaolin for paper coating.

The material comes from a preliminary dryer with 10% to 15% moisture. It is dried and ground in the Imp Mill and classified by the whizzer separator. The resultant product is a finely divided clay with less than one per cent moisture, and testing 99.95% through 325-mesh.

Other successful operations are calcining gypsum for manufacture of wallboard or stucco . . . drying and grinding limestone, diatomaceous earth, bauxite and other non-metallic minerals.

Write for detailed information

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1307 North Branch Street **CHICAGO**
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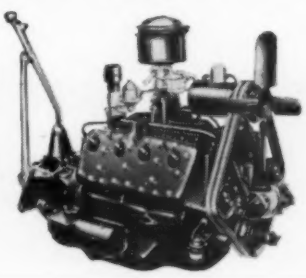
Don't send a boy to do a man's job

When there's a man-sized job to be done, tackle it with an engine powered for that job. • Ford is the only manufacturer to offer a V-8 engine of 95 horsepower in a low-price truck. With ten more horsepower and 13.3% more torque than the "85," this new power-plant gives an extra margin of acceleration, speed and pulling ability *with real economy*. The "95" is available in all Ford Trucks except the 122-inch One-Tonners. Ask any Ford dealer about an "on-the-job" test.

95-HORSEPOWER FORD V·8 HEAVY-DUTY TRUCK ENGINE



FORD MOTOR COMPANY • BUILDERS OF FORD V-8 AND MERCURY CARS, FORD TRUCKS, COMMERCIAL CARS, STATION WAGONS AND TRANSIT BUSES

COTTRELL
Gas Cleaning: ONE PRINCIPLE— UNIVERSAL APPLICATIONS

FOR TOUGH JOBS NOTHING ELSE CAN HANDLE

1. Billions of cubic feet of all kinds of manufactured fuel gas are being de-tarred ***every day*** by Cottrells; reducing back pressure throughout entire system, lowering labor and material costs in purifying and eliminating trouble in burners and apparatus.

2. Millions of cubic feet of smelter and hot roaster gas are being cleaned ***every minute*** in individual installations, with the recovery of metallic and other values that make the equipment self-supporting or highly profitable.

3. Billions of pounds of cement dust have been collected by the first Cottrell installed in this industry twenty-five years ago. The installation is still in successful operation without major alterations.

4. Fly ash from over a hundred pulverized coal fired boilers is being removed by Cottrells.

5. Over twenty installations of Cottrells are cleaning iron blast furnace gas.

NOTE THESE ADVANTAGES . . .

1. Efficiencies up to 99.99 per cent or over and at atmospheric or highly elevated temperatures.

2. Power consumption ranges from 0.5 to 1.0 kilowatts per hundred thousand cu. feet of gas cleaned.

3. In most cases the pressure drop is only a few tenths of an inch of water.

4. Cottrells are guaranteed to the desired efficiency on the basis of ***total*** solids entering the collector, ***irrespective of particle size or nature and with no strings on lower micron brackets.***

5. Cottrells are made in small sizes as well as large. Some assemblies are completely self-contained, and are shipped ready for the foundations.

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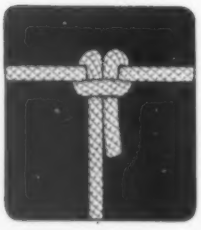

THE ENSIGN-BICKFORD CO.
Simsbury, Connecticut

Makers of Cordeau-Bickford Detonating Fuse
—and Safety Fuse Since 1836

Primacord-Bickford Detonating Fuse can be set off by means of fuse and cap or electric blasting cap. In either case, *this one cap is the only cap required for the entire blast.* It is attached after all holes have been loaded and tamped—after all connections have been made—after all equipment and lines have been removed—after all men have gone to a place of safety. The cap detonates the Primacord. The Primacord detonates each and every cartridge in the blast—whether there is one hole or a thousand.

Primacord has greatly broadened the field for detonating fuse—as you will see when you read the Primacord Booklet. May we send you a copy?

PRIMACORD·BICKFORD *Detonating Fuse*

PB7

1939
A MARION
YEAR FROM COAST TO COAST
More and more each year quarry operators are recognizing in Marion shovels, draglines, cranes and clamshells the many advantages they need to pile up profitable tonnage. That is why many prominent quarry operators . . . who have never bought Marions before . . . are continually switching to Marions today. Let us send you a list of new Marion owners in your vicinity so you can investigate their outstanding performance records. » » »
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I. J. LEBOLD, SAND & GRAVEL CONTRACTOR
Modernize WITH
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SHOVELS • CRANES • DRAGLINES • CLAMSHELLS
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THE FLOTATION PROCESS in the CEMENT INDUSTRY

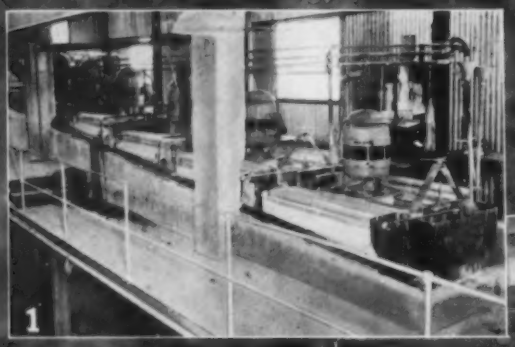

Fig. No. 1—Flotation plant, South Africa

Fig. No. 2—Flotation plant, Finland

Fig. No. 3—Flotation Laboratory and Pilot plant, Copenhagen

has for its object the improvement of inferior cement raw materials by removing the undesired quantities of minerals, making it possible to produce high quality cement from low-grade rock.

Cement raw materials from all parts of the world and of almost every type have been tested in our laboratories to determine process and reagents. Based on continuous tests on a semi-large scale in our pilot plant in Copenhagen, we have designed installations and determined operation costs for the introduction of the flotation process at several works. Of these, two are operating (Finland and South Africa) and another is being erected in South Africa.

For the whole world, with the exception of the United States, Canada and Mexico, we control all patent rights and are supplying machinery for the application of flotation in the cement and allied industries.

F. L. SMIDTH & CO. A/S

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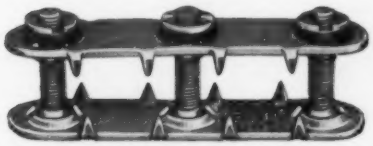
OFF AGAIN! ON AGAIN! GONE AGAIN! —FINNEGAN

WHEN Flexco HD Belt Fasteners and Alligator Steel Belt Lacing are used, the reports on belt maintenance jobs in sand and gravel and rock products plants read a good deal like Strickland Gillilan's Irish section boss' telegram about the derailment of No. 9.

With Flexco HD Belt Fasteners for your conveyor and elevator lines and Alligator Steel Belt Lacing for your transmission belts you take all the grief out of your belt fastening and repair work.

You can get these great improvements in belt fastening practice from your supply house.



SALVAGING DAMAGED CONVEYOR BELTS

● FLEXCO HD Rip Plates offer a means of repairing damaged conveyor belting and returning it to satisfactory service. Their use saves expensive replacements and extended shut-downs.

For strengthening small weak or "soft" spots, where the belt is just beginning to fail, bridge them with FLEXCO HD Rip Plates. Regular inspection for weak spots is advisable.

A TIGHT BUTT JOINT FOR CONVEYOR BELTS

● Note how the recessed plates of FLEXCO HD Belt Fasteners compress the belt ends. Internal friction and ply separation in belt ends is overcome. The tight butt of the belt ends prevents passage of materials through the belt.

Regularly made of special analysis steel for general use. To meet unusual conditions, can be supplied in corrosion resisting "Monel," non-magnetic "Everdur" and abrasive resistant "Promal."

Sole Manufacturer—FLEXIBLE STEEL LACING CO.
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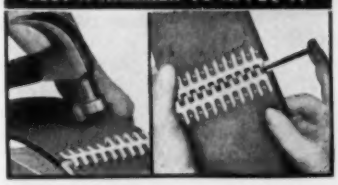

Over 200 million transmission belts have been laced with ALLIGATOR and here's why:

1 Without any fuss or monkey business it can be put on with a hammer and it drives straight.

2 It will handle the lacing problem for belts ranging from tapes 1/16" thick up to belts 5/8" thick and as wide as they come.

3 The belt can be unfastened in a jiffy —just remove the rocker hinge pin and the joint comes apart.

4 Alligator makes a joint that is smooth on both faces—it embeds in the belt and the compression grip protects the belt ends and keeps the plys from separating.

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● Folder WRP gives complete details on making butt joints, repairing rips and putting in patches.

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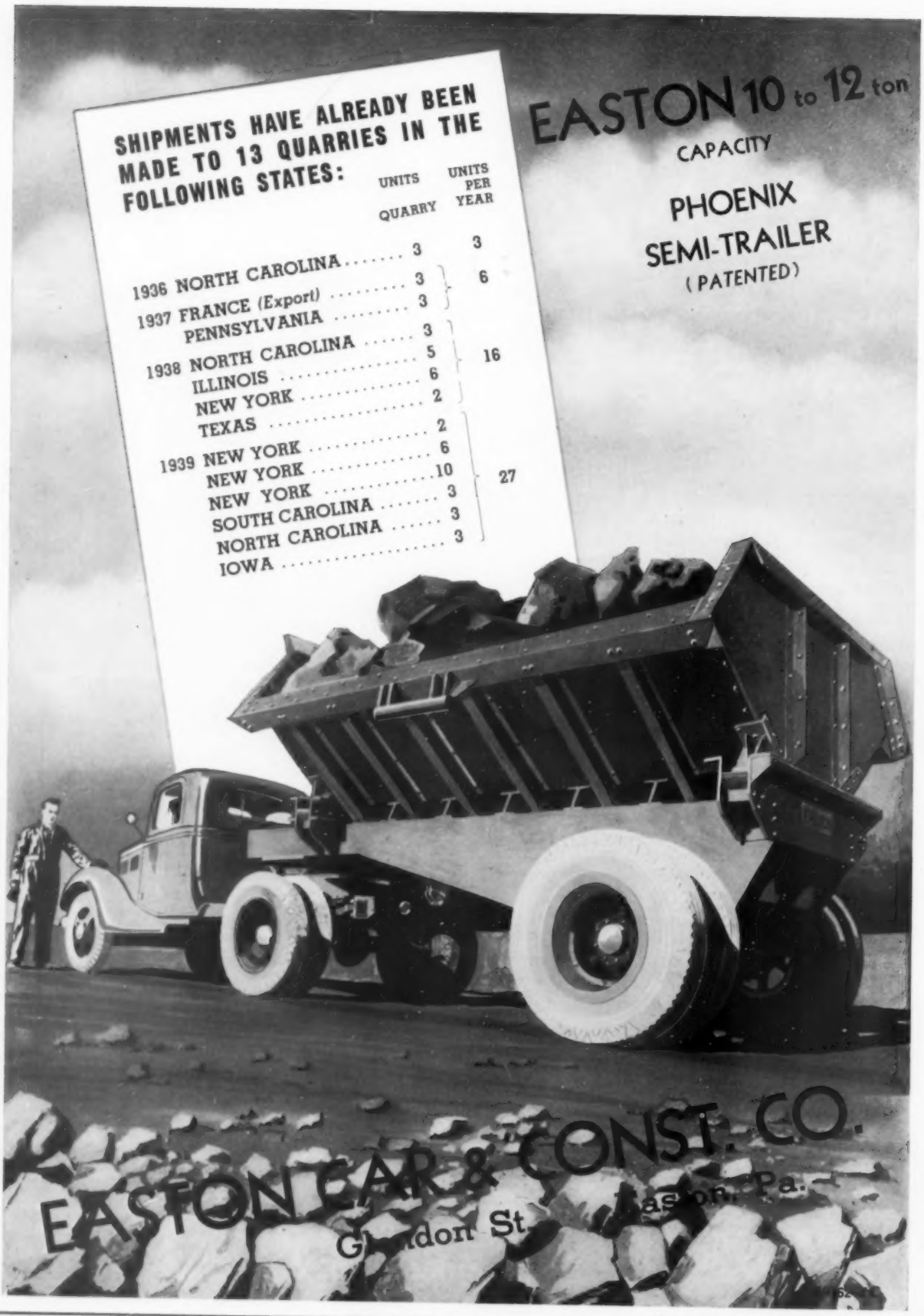
SHIPMENTS HAVE ALREADY BEEN MADE TO 13 QUARRIES IN THE FOLLOWING STATES:
UNITS QUARRY
UNITS PER YEAR
1936 NORTH CAROLINA ..... 3 — 3
1936 NORTH CAROLINA 3
1937 FRANCE (Export) ..... 3 — 6
PENNSYLVANIA 3
1938 NORTH CAROLINA 3
ILLINOIS ..... 5 — 16
NEW YORK 6
TEXAS 2
1939 NEW YORK 2
NEW YORK 6
NEW YORK ..... 10 — 27
SOUTH CAROLINA 3
NORTH CAROLINA 3
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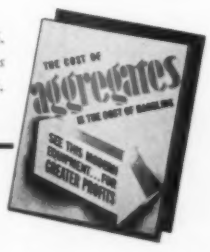

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ROCK PRODUCTS

Debt and Taxes

Many years ago there was a saying: "Nothing is certain in life but *death* and taxes." In those days if a man wanted a chair or a table, a book or a bookcase, he saved a little each day until he had accumulated the price. While he was saving he had the joy of anticipation, which is nine-tenths of the joy of possession. Man was close to nature and he knew some of its simple laws.

In those days, if a man wanted to go into business—be an enterpriser—and had no capital, but was of good character and had industry, he went to a local banker or capitalist, who knew him well, and borrowed the price of a horse and cart. Both the banker and the borrower expected the horse and cart to pay for themselves within a reasonable time. If successful, the enterpriser was soon out of debt, and he had the joy of achievement—the only real joy or satisfaction gained from professional, business or industrial enterprise.

In those days, if an enterpriser wanted to expand his business and buy another horse and cart, and employ a helper, he either saved the earnings of his first venture, or again he borrowed. The only reason he would want to invest his savings, or his borrowing, in more equipment was because he expected his helper—his labor—to return a profit from the use of it.

In those days the capitalist and the enterpriser and the laborer all knew that *work* done was the source of all profit, or income, or production, or service; in short, the source of all wealth. Capital was merely a liquid form of wealth, for the purpose of supplying workers with implements to work with, to produce more wealth.

At length there came a time when someone with a bright idea, but no benefactor of mankind, made it possible for one to have anything he wanted, and "to enjoy the use of it while paying for it." Thus did fear of the installment collector replace strong-willed thrift, and the agony of uncertain possession replace the joy of anticipation; and the butcher and the baker and the tailor were robbed to keep the car, and the moral fiber of the common man weakened.

And about this time bankers and capitalists (big and little, including many, many laymen) also became so confused and weak in moral fiber that they mistook beautifully engraved pieces of paper for wealth. Such were bought and sold, which had behind them no more real investment of *work done* than that which went into the making of the paper they were printed on.

The enterpriser of today may be the president of a hundred million dollar corporation and instead of a horse and cart he may need a fleet of a thousand motor trucks and many other pieces of equipment, but the fundamental relationship of enterpriser, capitalist, labor and government has not changed and can not change so long as we stick to American conceptions of free enterprise and of government. Our forefathers knew their government for what it was and still is, a wealth-consuming organization of themselves for themselves. They credited it with no more wisdom or insight than they themselves possessed. They hated taxes because they represented their money that government must spend. They were close enough to their government to know that its debt was their debt—and they hated debt.

What would those men, actually more familiar with the practice of political economy than we are, think if their government were to take so much of the income from their enterprises that to finance business expansion from its earnings would become impossible? What would they think if the only solution that their government could suggest was an offer to loan them credit borrowed from other citizens; because, so their government tells them, capitalists who know you won't now loan you money? What would they say, knowing that the reason bankers won't loan the money is because the government itself has greatly reduced the chances of ever paying it back?

It is only too true that small business needs capital. But what is needed is an opportunity to earn and accumulate capital, for capital is savings based on work already done. Debt is a mortgage or prior claim on work yet to be done. It is bad enough for an enterpriser to have to give up most of the present proceeds of his enterprise to government, but to mortgage its future to the same government is to assure his successors that: "Nothing is certain in life but *debt* and taxes."

It seems to us as simple as ABC that the greatest service government can render to industry and hence to society is to encourage old-fashioned thrift. Thrift develops character and more strength of character is what we need. With strength of character will come enterprise. No business man acquainted with the rudiments of economics, which all business men acquire from experience, will ever have much faith in a government so lacking in character and experience that it treats debt so lightly as the one in Washington today. That is why assurances of a policy of "business appeasement" have so little effect.

Nathan C. Rockwood

Deleterious Materials

Pennsylvania Aggregate Producers Find Ways to Meet Higher Quality Standards

By BROR NORDBERG

Pennsylvania producers of crushed stone and sand and gravel in most instances have taken a coöperative attitude toward the Highway Department's demand for higher quality and cleaner aggregates by using new methods and equipment to eliminate objectionable material. In certain sections of the State deposits of both stone and sand and gravel contain too high percentages of friable and deleterious substances to make their elimination practical. Thorough exploration and examination might have revealed that these deposits should never have been opened up on a commercial scale. As a result, the output of these pits and quarries is necessarily confined to the lower grade types of construction.

In other localities, however, aggregates which may or may not have contained too much soft material are now definitely qualified as type A gravel and stone for highway construction purposes through the proper use of some type of eliminating machinery.

Three distinct types of plants in the Williamsport area will serve to illustrate three entirely unrelated methods which are obtaining satisfactory results in the elimination of undesirable material. In describing these plants the use of the expression "soft stone" alone does not adequately cover the refinements in processing because the improvements have been made more broadly in the interests of higher quality. Dust and dirt are being more thoroughly removed, and the selection of equipment might be termed insurance against an occasional excess of soft material. In other words, while tests in many instances would reveal that eliminating machinery is unnecessary because too much soft material is not shown to be present, the producer is reasonably certain that when operations are carried on in questionable strata his plant is adequate to take care of any undesirable material. When working the better strata, which is more often the case, the eliminating equipment in each plant is instrumental in producing a much more desirable product than heretofore.

"Dry Cleaning" for Preparation of Crushed Limestone

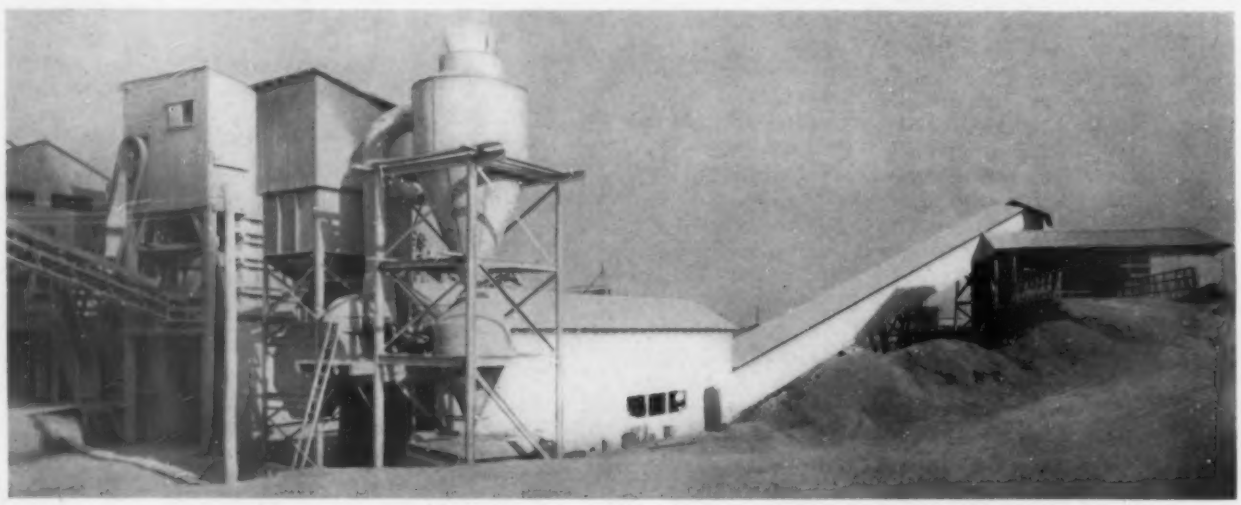
The Lime Bluff Co., Muncy, Penn., illustrates the use of "dry cleaning" equipment in preparing crushed limestone for use in the higher types of construction. C. C. Hartsook, general manager of the company, which has been in operation since 1919, is an advocate of dry screening and has adopted a novel way of getting rid of dust and friable material.

Strata in the quarry comprises a blue limestone, with an occasional ledge of reddish stone, which is capped with about 14 ft. of stone that is being removed and wasted. The greatest possible source of soft and friable stone is in the top strata and occasionally, in blasting, some of it will be blended in with the true stone.

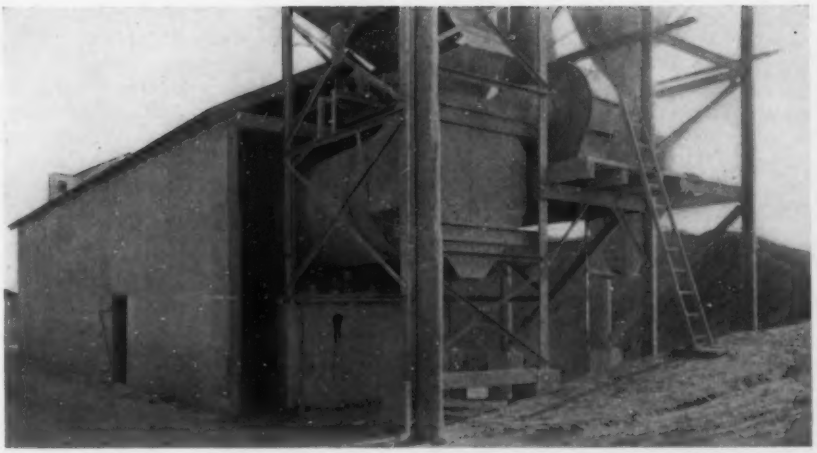
Much of this soft material is broken down and converted into dust in passing through revolving screens and crushers where it is subject to abrasion and impact. However, Mr. Hartsook has made an installation of original design to go a step farther in the removal of dust and in breaking down any soft material that passed the crushers.

His arrangement consists of a revolving cylindrical drum, similar to a rotary cement clinker cooler, with an induced draft through the drum to remove dust as formed under impact. The drum is 6 ft. in diameter and 55 ft. long with a shell thickness of ½ in. All ¼- to 1½-in. stone, representing 30 to 40 tons per hour of the output, is taken from the plant bin gates over a 20-in. belt conveyor, 40-ft. centers, and placed in a 20-ton bin over the feed end of the drum.

From the bin, stone is fed into the drum over a Telsmith adjustable reciprocating feeder. The drum is tightly closed at the feed end and open at the discharge end. Twelve 1-in. thick steel blades, or lifters, the length of the cylinder, cascade the stone and cause each particle to drop 6 ft. to the bottom of the cylinder in its travel toward the discharge end of the drum.



Auxiliary plant of the Lime Bluff Co., Muncy, Penn., designed to break down soft stone particles and to remove dust. Left to right: Feed bin, fan and cyclone collector, and the inclined conveyor to the screen house for re-sizing the stone



Feed end of rotary drum at Lime Bluff Co. plant which was installed to break down any soft particles. Fan and cyclone collector, on the right, catch dust generated in the drum

The drum is driven at 9 r.p.m. by a 50-hp. motor through a combination of V-belt and speed reducer. About 12 minutes is required for the stone to travel the length of the drum, which has the standard slope. Each stone particle in passing through the drum receives 216 impacts against steel from a height of 6 ft. before it discharges to a belt conveyor.

A fan pulls 18,000 c.f.m. of air through the drum counter-current to the direction of travel of the stone and discharges into an 8-ft. diameter Sprout-Waldron cyclone outside the plant. About 25 ft. of the lifter blades within the drum are perforated to allow dust to filter through to the center of the shell where the air blast can be more effective.

From the drum, stone is carried over a 20-in. belt conveyor, 114-ft. centers, to a 3- x 10-ft. Symons horizontal triple-deck screen where it is re-sized and placed in bins, with a capacity of 300 tons, for shipment by truck. In addition to the drum drive, electrical equipment includes: a 2-hp. feeder motor, a 30-hp. fan motor, a 10-hp. motor for the conveyor from the bins, a 7½-hp. motor for the conveyor handling clean stone, and a 5-hp. motor for the horizontal screen.

Sell Dust Products to Farmers

About 12 tons of dust is recovered in the cyclone in 10 hr., or 3 to 4 percent in a normal operation, which is sold to farmers for agricultural purposes. Normally ½ to 1 percent represents fracture in the drum and the remainder is dust carried into the dryer with the stone. The installation is precautionary, but very probably would break down and remove material of objectionable character should such stone be excavated in the quarry. It is planned at a later date to introduce heat into the drum to make the blast of air even more effective in removing dust from the larger particles. At present, the quarry is generally not in operation in wet weather. The installation has been in operation since early in 1938.

Eliminating Deleterious Materials By the Wet Process

At Mountoursville, Penn., the Lycoming Silica Sand Co. has been operating successfully since 1935 a commercial machine, known as the Knickerbocker soft stone eliminator, for the production of a higher quality aggregate. This concern is one of several in the vicinity with operations in a pit deposit which, according to geologists, had been laid down by streams. Sand was the principal product for over 21 years, until three years ago, the finer particles of material being free from any appreciable amounts of deleterious material and representing from 50 to 60 percent of the plant output.

Gravel was sold generally for secondary purposes due to the presence of particles known to be friable and of an injurious character. The gravel contains particles of carboniferous composition, some peat and some lignite, which are comparatively soft and when subjected to heat, disclose a definite ignition loss.

This material did not necessarily condemn the gravel for type A rating when used by the State, but the Lycoming Silica Sand Co. did not choose to develop this market until it found a satisfactory method of lowering its percentage considerably when subjected to tests for quality.

In 1935, the eliminator was installed and the plant was re-arranged to facilitate the removal of questionable substances from gravel to be classed as type A. Material from the pit is delivered to the top of the plant by belt conveyor and is introduced into a combination rotary scrubber and screen where wash water is added. The scrubber section is 8 ft. long and the screen section 10 ft. The screen, which is double-barreled with a 4-ft. inside diameter, has openings 2½-in. square on the inside shell and ⅝ in. sq. outside to take out the sand and some pea gravel. Oversize stone is crushed and returned to the screen, while the gravel between the two screens is taken by belt bucket elevator and discharged into the soft stone eliminator. This size classification is about 60 percent of the plant production of 125 tons per hr.

Operating Eliminator at Most Efficient Speed

The stone eliminator consists of an internal rotating ring of 36-in. diameter with regularly spaced openings through which the gravel is thrown against the outside housing at high speed. Each particle is subjected to impact against the rotating ring, then against the housing and a rebound to the rotor before discharging from below out of the eliminator. The eliminator is driven by a 20-hp. motor

Looking into new log washer from discharge end showing new design of sides to prevent overflow. In the background is horizontal screen from which washer receives its feed. This installation is in the Narehood Bros. plant at Milton, Penn.

through V-belt. Any one of three sheaves can be used for a fast, intermediate or slow speed of rotation.

The second speed, of about 1750 r.p.m., has been found most practical in this plant. At this speed a greater percentage of the soft material is broken down than is possible at the lower speed. At the highest speed, wear on the rotor and the shell of the eliminator was too great and breakage of gravel into fines was excessive. At the intermediate speed, soft material is broken down by impact to well below the limits required in the Los Angeles Rattler test adopted by the State, and a good percentage of the gravel is fully

Mechanical device at the plant of Lycoming Sand and Gravel Co., Montoursville, Penn., through which gravel is passed and subjected to impact under high velocity to break down soft particles and make the finished product acceptable under state specifications. Feed is wet over belt conveyor on the right, and after treatment is resized over vibrating screen which may be seen below

or partially crushed by the impact. A high percentage of crushed and partly crushed gravel is desired for type A gravel.

To assist in washing out broken down fines, water is added directly into the top of the eliminator through a 1-in. line and the total discharge is then re-screened over a 4- x 8-ft. double-deck Telsmith "pulsator" screen, having 1¼- and ¾-in. sq. openings on the top and bottom decks, respectively. The two top separations go into bin storage and the minus ¾-in. material is passed over a 4- x 8-ft. Robins single-deck vibrating screen with 5/16-in. square openings. Gravel retained on the screen goes into storage and the throughs are laundered into the sand washers.

To impart a double washing action, the flume discharge is split to two 30-in. diameter Lewistown screw washers followed by two others of identical size. About 1000 g.p.m. of water ultimately passes through the washers. Broken down soft material and other objectionable matter are floated over the tail-boards of the washers and wasted. In making mason's sand, some of the sand in the flume is diverted to a separate 30-in. screw washer.

Specification For Type A Gravel

For type A gravel the State has specified that the maximum loss when subjected to 500 revolutions in the Los Angeles rattler must not exceed 35 percent by weight and there must be a minimum of 40 percent totally-crushed gravel particles. This material is used for high-type construction such as bridge wearing surfaces, highway wearing surfaces, etc. The top size must practically all pass a 2½-in. ring and the gradation is as follows:

100 percent	minus 2¾-in. round
95-100 percent	minus 2½-in. round
30- 65 percent	minus 1¼-in. round
5- 20 percent	minus ⅝-in. round
0- 8 percent	minus ⅜-in. round

Before installation of the eliminator, the Los Angeles rattler test showed a loss of 34 to 42 percent on this material, which was slightly high to qualify as type A material, but good enough to meet the type B and C restriction of a maximum of 45 percent loss.

Average samples now run in the neighborhood of 25 percent with an upper limit of 30 percent occasionally. The percentage of crushed particles has increased from slightly over 40 percent to 60-65 percent totally crushed and 80 plus percent partially crushed. This is an added advantage for which some compensation is allowed by the State in its computation of the rattler loss. Quite naturally, the general average size of the particles fed into the eliminator is reduced.

With this improvement in the product, markets of the company have been expanded considerably, and it is no longer necessary to exercise care in selecting the part of the pit in which operations are to be carried on.

Maintenance of the eliminating equipment, which is subject to intensive wear, adds about 5c to the cost of producing each ton of material. The rotor and shell, which are of manganese steel and have an average life of 20,000 tons, are replaced simultaneously.

Intensive Scrubbing Action Used in Third Method

These two plants—one dry, one wet process—illustrate two types of treatment by impact which have brought favorable results. The third distinct type is the application of intensive scrubbing action in a wet process stone plant. The operators of the plant, Narehood Bros., Milton, Penn., are producing about 200 tons of stone per hr. at a quarry near Washingtonville.

The plant was a dry operation until 1935, when washing equipment was installed to better the product. Recently, additional washing facilities have been provided.

Dry-screened stone is now produced for ballast, but any desired size can be diverted from the secondary crusher to a washing plant. Before washing equipment was installed, minus 1-in. material was wasted to get rid of dirt.

In 1935, a 25-ft. McLanahan and Stone double steel log washer was installed to break down soft material and to scrub the stone thoroughly. About 300 g.p.m. of water is introduced into the scrubber, the overflow from the tail-board is wasted, and the stone is sized over a triple-deck 4- x 12-ft. Niagara vibrating screen.

In 1938, a second washing plant with a similar scrubber was placed in operation, independent of the first unit. The purpose of this plant is to wash material taken from the dry stone bins direct or after reduction through a 3-ft. Symons cone crusher with a fine bowl. The log washer is preceded by a 4- x 16-ft. Symons double-deck horizontal screen,

(Continued on page 40)

Modern Wet Process Plant Replaces "Dry" Mill

Second Article Describes the Kiln Firing Units, Burning Control, and Clinker Grinding

By C. D. RUGEN*

One of the two 10- x 300-ft. kilns with the second directly behind it. To the right is the feed building and stack

In the modernized Leeds, Ala., plant of Universal Atlas Cement Co., there are two complete parallel clinkering units each consisting of a unit coal pulverizer, a 10- x 300-ft. rotary kiln, and an air-quenching vibrating clinker cooler. All of these must operate as a unit; hence from the standpoint of operating technique they must be considered collectively. The capacity of both units is 4000 bbl. of clinker per day. Methods of operation of this equipment represent quite a departure from those required for burning the old dry process kilns. Hence, the operating personnel in changing from the old operation to the new was confronted with many new problems and the necessity for developing new ideas and techniques. Performance has steadily improved since the first clinker was produced and as more experience is gained progress will continue. The equipment installed in this department has been found fully adaptable to present day requirements for the efficient and economical production of quality clinker at varying specifications.

Coal Mills

Alabama bituminous coal containing about 5% moisture as received is fired by drying-in-the-mill type unit pulverizers. Coal is unloaded from railroad cars to a track hopper from which it is conveyed and elevated to overhead mill bins. Pulverizers and the fans supplying them with preheated air are set on the reinforced concrete burning platform. Mills are driven by 75 hp., 440-volt, 1200-r.p.m. motors through V-belts, and fans are driven by 60 hp., 1800 r.p.m. direct-connected motors. Total power requirements for pulverizers, fans and the raw coal conveying and elevating equipment average about 20 kw.h. per net ton. Each pulverizer has a capacity of 5 net tons per hour at 80% through 200-mesh. Mills are equipped with internal fixed-vane classifiers set above the grinding elements.

A sealed table feeder built integrally in each mill regulates the coal delivery rate to the pulverizer. This feeder is driven by a two-speed motor controlled by the action of air pressure differentials. One differential taken across the mill indicates the coal load in the pulverizer and another taken across an orifice in the air inlet duct to the mill indicates the rate of air flow through the pulverizer. These two differentials oppose each other through diaphragms in the pressure controller which actuates the high speed, low speed and off contacts on the coal feed motor. This regulation insures uniform fuel delivery to the kiln and is capable of simple and rapid adjustment to different firing rates. The two differentials in inches of water are recorded continuously on a curve drawing meter.

The fan supplying the preheated coal-drying and primary-combustion air may take air either from around the brickwork of kiln hood and cooler or from above the grates in the clinker cooler. More uniform results have been obtained by taking all of the air from around the kiln hood and cooler brickwork. An adjustable sleeve over ports in this kiln hood air duct provides means of controlling the admission of varying quantities of atmospheric air. In this way temperature of preheated air to the mills may be regulated to suit requirements, although once established only infrequent adjustments are necessary.

The rate of pulverized coal delivery from the mill is a function of the volume of air passing through the mill. Hence, in order to make a change in firing rate it is necessary only to make a change in air flow rate. This is accomplished by manual adjustment of a control damper on the fan inlet duct. The movement of this damper is effected through a double worm gear, permitting small and accurate adjustments. Damper positions are indicated on a graduated dial which has been calibrated in terms of coal delivery per unit of time for various settings. Such calibrations may vary to some extent with changes in air temperature and coal grindability. However, the use of coal from only one source and the relatively uniform air temperature reduces such variations to a minimum.

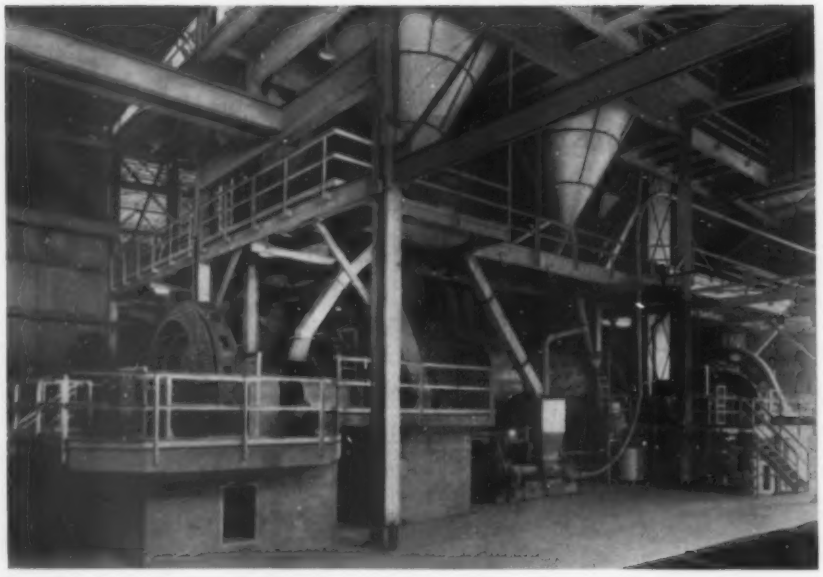
The drop in temperature of the air in passing through the mill depends on the temperature of the raw coal and the amount of moisture removed by evaporation. Mill outlet temperature is maintained fairly constant at about 180 deg. F., low enough to eliminate dangers of pre-ignition. The coal-air mix leaves the top of the pulverizer and delivers to the kiln through a blast pipe with water-cooled burner tip.

Kilns

The two new 10- x 300-ft. kilns set at a pitch of $\frac{7}{16}$-in. per foot are each supported on five sets of rolls. Kilns are driven by 125-hp., 230-volt, d.-c. motors equipped with Ward-Leonard speed control. This enables accurate kiln speed regulation up to a maximum of 100 r.p.hr. Direct current is produced by 200 kw. motor generator sets. A continuous record of kiln speed is made by a recording tachometer located on the burning platform.

The first 10 ft. of kiln length from

* Mr. Rugen is assistant operating engineer of the Universal Atlas Cement Co., Chicago, Ill.



General view of clinker grinding mill, separators, and electric motor drives

the firing end is lined with a 9-in. thickness of first quality, hard-burned firebrick. The next 60 ft. is lined with 6-in. thickness of high alumina brick, and the remainder of the kiln with standard 6-in. fireclay brick. A section 148 ft. long, starting about 71 ft. back of the discharge nose, has two inches of insulation placed between the brick and the steel shell. Heat exchange chains are installed for 35 ft. of kiln length at the feed end of one kiln. Up to the present time the second kiln has been operating without chains.

Exhaust gases pass from each kiln through individual flues equipped with motor-driven louvre type dampers for draft control. These flues connect to a common flue leading to a 12½- x 200-ft. concrete stack. Each damper motor is operated through an automatic draft controller which may be set to hold a constant backhousing draft, constant firing hood draft, or may be operated to maintain a constant pressure differential between kiln backhousing and firing end hood. This latter system has been found the most desirable from the standpoint of combustion uniformity. It is planned to install induced draft fans to augment the present stack draft if and when additional heat exchange chains are placed in the kilns. Dust which settles in the exhaust flues drops through hopper bottoms into collecting screw conveyors. The collected dust is elevated to the feed end of the kilns where it is fed back with the slurry.

Cold air infiltration at the firing end is minimized by a seal ring between kiln shell and kiln hood. The kiln hood brickwork is a continuation of a vertical brick chute connecting to the clinker cooler. A baffle wall divides the chute into two sections so that the secondary combustion air coming up from the cooler is separated from the clinker dropping to the cooler grates.

Clinker Coolers

Vibrating grates of each clinker cooler are 4½ ft. wide by 70 ft. long. The first 22 lineal feet of grates at the feed end of the cooler may be considered as the primary cooling section and the rest of the length as the secondary cooling section.

The primary section is supplied by air from a fan rated at 20,750 c.f.m. at 4-in. static pressure. Air delivery to this section is maintained constant by an automatically controlled louvre type damper at the fan outlet. This damper is operated by an air motor actuated through pressure differentials taken across a venturi throat in the fan inlet duct. In this way a constant rate of air delivery is maintained independent of conditions of temperature and barometric pressure. The first two feet of grates at the feed end set at an incline act as a blast quencher with air admitted through an auxiliary damper-regulated duct inside the main duct. A hinged and movable baffle plate suspended across the cooler above the grates near the discharge end of the primary section insures delivery of a fixed proportion of the metered air to the kiln as secondary combustion air. Air passing through the grates beyond the baffle plate is wasted. The quantity of metered air can be apportioned to the combustion requirements of the kiln through simple adjustment of the damper-control meter.

Grates are continuous through primary and secondary sections throughout the entire length of the cooler. Cooling air for the secondary section is supplied by a fan rated at 34,800 c.f.m. at 2 in. static pressure. All of this air after passing through the clinker is wasted to atmosphere through a large diameter stack.

To insure uniform cooling it is necessary to maintain a uniform thickness of clinker on the grates. This is accomplished by regulation of the frequency of grate vibration. Pressure variations below the primary grates, acting through a pressure switch, change the rotary speed of the eccentric drive shaft. This pressure is maintained at or near a constant head which tends to equalize the clinker bed thickness and the air flow rate.

Clinker is cooled to near atmospheric temperature with the exception of incidental large pieces and may be ground immediately if desired. The output of each cooler is elevated to an automatic belt scale which weighs and discharges the clinker to storage.

Burning Control

A rather complete installation of instruments has been provided to aid in the operation of the clinkering equipment. Two control panels located on the kiln firing platform contain identical sets of meters, controllers, and motor switches for each clinkering unit. Principal instruments are as follows:

Automatic—
1.—Kiln draft controller. 2.—Coal feeder controller. 3.—Cooler speed controller.
Recording—
4.—Radiation Pyrometer on kiln-lining temperature. 5.—Pyrometers on kiln exit gas and secondary air temperatures. 6.—Two pen thermometer on air temperatures in and out of coal mill. 7.—Kiln draft meter. 8.—Secondary air-flow meter. 9.—Two-pen coal mill pressure differential meter. 10.—Kiln speed tachometer. 11.—Kiln revolution counter. 12.—Kiln feeder revolution counter. 13.—Manometer on pressure under the primary cooler grate (indicating).

In addition to the above each panel is equipped with manual control switches for all equipment in the system and indicating ammeters on all principal motors.

Kilns have been operated both at constant kiln speed, using small variations in firing rates to adjust for heat requirements, and at constant firing rates, using small variations in kiln speed to correct for necessary heat requirements. The latter method has been found to be very satisfactory in dry-process kilns. The former method has advantages in wet kilns particularly from the standpoint of mud-ring formation, chain protection and material flow from the kiln. With all variables under complete control, of course, both kiln speed and firing rate can be maintained constant. Variations in secondary air temperature and possible irregularities in material flow through the

kiln are two factors tending to upset complete uniformity of kiln operation. The automatic control of draft, secondary air quantity and coal firing rate, plus the information furnished by the numerous instruments, aid in obtaining more intelligent and economical operation of the kilns. Many of the instruments now installed as operating guides can be converted readily to automatic controllers whenever desired.

Clinker Grinding Department

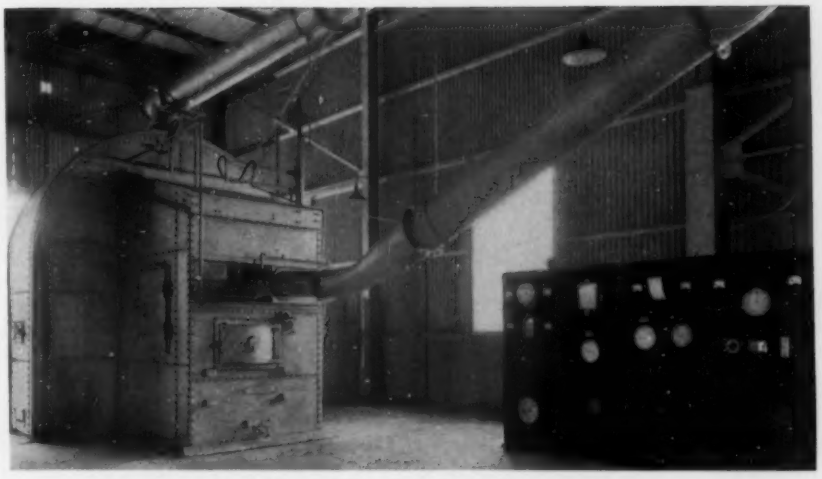
Cooled clinker is distributed in and reclaimed from the 100- x 280-ft. covered storage by an overhead 10-ton bridge crane with a 3 cu. yd. bucket. This crane also handles the necessary gypsum. Clinker and gypsum are placed in separate hoppers each drawn by automatic proportioning belt scales similar to those used for proportioning raw materials. There are two complete grinding units, each served with its own pair of proportioning scales. The gypsum belt speed is about 5% of the clinker belt speed since it is designed to carry about the same load depth. Predetermined feed rates are maintained within very close limits.

Grinding units in each circuit consist of a 9 ft. diameter by 8½ ft. long preliminary ball mill and an 8- x 30-ft. two-compartment secondary finishing mill. Each compartment of the secondary mill is closed circuited with a 16-ft. mechanical air separator powered with a 75-hp. motor.

Each preliminary mill is driven by a 350 hp., 2200-volt, high-starting torque, synchronous motor. The secondary compartment mills are driven by similar type 700 hp. motors. Preliminary mills rotate at 19 r.p.m. or 73% of critical speed and the secondary compartment mills turn at 18½ r.p.m. or 67% of critical speed. Mill liners are rolled steel plates with lifting elements similar to those installed in the raw grinding mills. Mills are carried on water-cooled babbitted bearings which are lubricated from a central oiling system.

Preliminary ball mills are loaded to 38% of volume with a graded charge of 3-in., 2½-in., and 2-in. balls. Each compartment of the secondary mill is loaded to 35% of volume. Balls in the first compartment are 1¼-in. and under and in the second compartment ⅞-in. and under. Higher ball loads may be desirable up to the limit of safe loads on bearings and motors. Ball loads and mill speeds for maximum performance of a grinding circuit are factors that have not yet been fully determined at this plant. Experimentation along this line will be continued.

The complete clinker grinding department operates with 7 to 7½ kw.h. per barrel at an output of 135 to 140 bbl. per mill hour. About 100 hours of clinker grinding per week will handle the output of the two new kilns.



Kiln firing hood and control panel to the right

Mills, separators, elevators, and conveyors are all electrically interlocked. Failure of any driving mechanism will shut down all equipment in the circuit ahead of it. The interlock also makes necessary the proper sequence in starting the various motors in the circuit.

Grinding Circuit

Proportioned clinker and gypsum discharge to an elevator which delivers to a screw feeding through the trunnion of the preliminary mill. This mill, operating in open circuit, produces sufficient secondary mill feed to enable full capacity operation of the unit. A period of experimental operation during which the preliminary mills were close-circuited with vibrating screens failed to improve output or fineness of this circuit. Hence, the preliminary mills are operating in single open circuit. This mill product is discharged through the trunnion to an elevator delivering to the secondary mill.

Following is a typical sieve analyses of open circuit preliminary mill discharge.

Sieve Size	Cumulative % Passing Sieves
4-mesh	99.7
8-mesh	99.2
14-mesh	97.7
28-mesh	87.8
48-mesh	73.4
100-mesh	57.4
200-mesh	43.3

The secondary two-compartment mill is fed through trunnions at both ends and discharges in the center. The first compartment and its separator are termed the "A" circuit and the second compartment and its separator the "B" circuit. The discharge of the preliminary mill circuit joins the tailings from the "A" air separator, and is fed through the trunnion to the "A" compartment. Product of this compartment is discharged through peripheral ports near the center of the mill to an elevator feeding the "A" separator. Fines from the "A" separator, along with tailings from the "B" separator, feed the "B" compartment of the mill. Product of this compartment becomes the feed to the "B" separator. The fines from the "B" separator are finished cement which is discharged to a pneumatic conveyor that pumps it to the stockhouses. An automatic sampler collects cement from the pump hopper for routine physical and chemical analyses.

Circulating loads carried in each of the two secondary circuits are of the order of 150% to 200%. Determination of the best loads for any given fineness of product requires circuit balancing through air separator adjustments. The air separators are of the type having wide application in the cement industry and methods for their adjustment are generally familiar. These adjustments permit considerable flexibility in the balancing of the grinding circuits. There are no surge bins or storage hoppers between preliminary and secondary circuits. Hence, to obtain maximum performance each of the grinding stages must be balanced with the others since the flow of material is continuous from clinker feed to cement discharge.

Specific surface of open circuit preliminary mill product when grinding standard cement averages 450 sq. cm. per gram at about 45% through 200-mesh. Product of the second stage grinding ("A" separator fines) is of the order of 1200 sq. cm. per gram at about 82% through 200-mesh, and finished cement averages 1750 sq. cm. per gram at 96%-97% through 200-mesh. Finenesses and loads in various parts of the circuit are quite consistent for constant feed rates and adjustments of fineness controls on the separators. The use of air-quenching clinker coolers minimizes variations in clinker grind-

ability. The controls available in this type of grinding circuit permit finished cement fineness to be varied at will to suit requirements and are particularly useful in the production of finely ground cement.

An experimental grind has been made on a similar installation with the following change in the above circuit. The fines discharged from the "A" separator were delivered to the "B" separator instead of to the "B" compartment. This change in circuit removes acceptable finished material from the "A" circuit before regrinding. Feed to the "B" compartment then consists only of "B" separator tailings. An increase in grinding capacity of about 5% has resulted from this change.

Dust Collection

Each clinker grinding circuit is equipped with a cloth type dust collector which maintains a negative pressure throughout the system and also provides air circulation through the mills, elevators and conveyors. The total air handled through each circuit approximates 7000 c.f.m. measured at 70 deg. F. Of this about 1200 c.f.m. passes through the preliminary mill and about 3000 c.f.m. through the two compartments of the secondary mill.

Air leaves the preliminary mill at about 160 deg.-170 deg. F. and is taken from the secondary mill at about 175 deg.-200 deg. F. The total heat gain by the air entering the dust collectors is sufficient to produce approximately 40 deg. F. temperature rise in the cement. Thus the cooling throughout the system is appreciable. Finished cement discharges from the "B" air separator at about 200 deg.-210 deg. F.

Collected dust is discharged continuously from the dust collector hoppers through star-wheel feeders into the "A" circuit feed elevator. Each collector is rapped two to four times per hour.

Central oiling is used for lubrication of principal bearings on grinding mills and kiln rolls. Three independent systems are provided—one for raw grinding mills, the second for kiln rolls and the third for clinker grinding mills. Oil tanks, pumps, and a small gas fired steam boiler for heating oil lines in cold weather are located in an oil house under the kilns. Oil pressure in each system is maintained by two automatically controlled pumps operating in parallel. Oil is pumped through cloth filters before use and recirculated oil returns from bearings to a sump in the oil house. This system results in economies in the use of oil and labor and assures proper lubrication of all bearings served.

Deleterious Materials

(Continued from page 36)

where some of the finer sizes are screened out dry and any of the remainder is passed into the log washer. The washed stone is re-sized over a 4- x 12-ft. triple-deck Niagara screen and placed in bin storage.

One of the problems encountered in this deposit was from certain seams of soft stone which had been altered by water and other wearing agents. As a rule this stone had been selected out and wasted in the quarry, but with the present equipment this precaution is not necessary. There is little danger of rejections. These particles usually have an outer surface of scale, or deposit, which is readily broken down by the log washers.

Some consideration has been given by the State to the adoption of the Los Angeles rattler test for stone, but the quality of stone at present is based on a maximum of 2 percent loss when subjected to static pressure in the laboratory. It is difficult to measure to what degree the washing plant has improved the quality of the product on test, but State inspectors now seldom discover sufficient suspicious stone to justify the pressure test for soundness.

These three installations are typical illustrations of the coöperative attitude taken by producers in providing high quality aggregates for the State of Pennsylvania and other consumers of their products.

Sodium Chloride for Road Stabilization

A BROCHURE ON the use of sodium chloride or common salt in road stabilization mixtures is being distributed by International Salt Co., Inc., Ithaca, N. Y. The report, entitled, "Developments in Road Stabilization with Sodium Chloride", was prepared by C. D. Looker, director of research.

It is pointed out in the report that the majority of salt-stabilized roads have been built of soil binder and various kinds of aggregate, including natural gravel, slag and crushed stone, especially limestone.

Very often prepared gravel is run through a crusher to make the material conform to proper gradation and effect a more thorough mixing. Only a very small clay content is used in the stabilized road mix, using salt.

In certain regions, sodium chloride treated quarry screenings, especially limestone, are used without the use of any clay as binding material. The fine limestone dust and salt serve to hold the coarse particles in a firmly bound, stabilized mat. In a number of quarries great piles of fairly well proportioned screenings have accumulated over a period of years as a by-product from other operations.

These are being put to good use in making what might be called salt-bound-stabilized limestone roads or salt-bound-stabilized macadam. Salt makes limestone more soluble than it is in plain water and adds to its natural binding qualities. In some cases additional clay has been added to stone screenings and, in still others, crushed limestone has been used to advantage as the coarse aggregate in clay-stabilized roads.

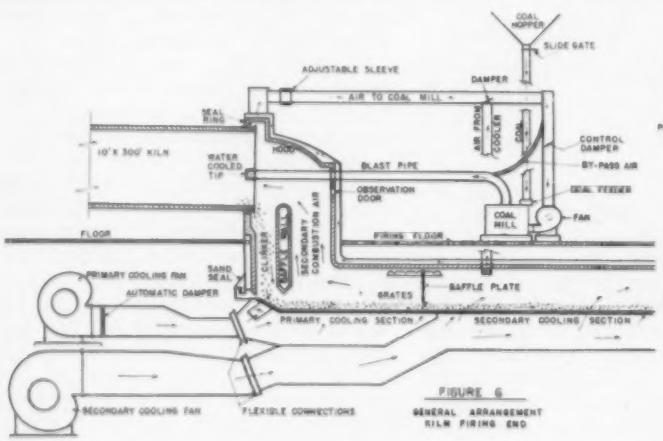
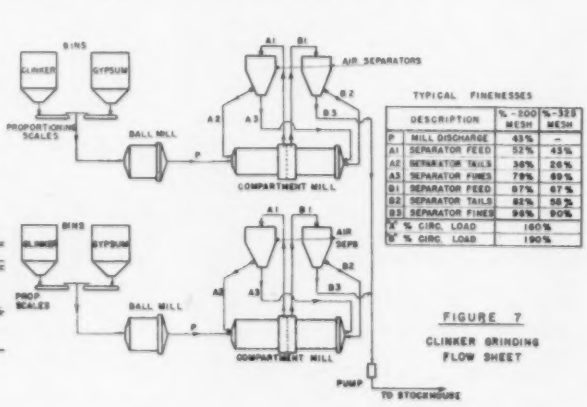


FIGURE 6
GENERAL ARRANGEMENT KILN FIRING END



TYPICAL FINENESSES

	DESCRIPTION	% - 200 MESH	% - 325 MESH
P	MILL DISCHARGE	43%	–
A1	SEPARATOR FEED	52%	43%
A2	SEPARATOR TAILS	38%	26%
A3	SEPARATOR FINES	79%	69%
B1	SEPARATOR FEED	87%	67%
B2	SEPARATOR TAILS	82%	58%
B3	SEPARATOR FINES	98%	90%
'A' % CIRC. LOAD		160%	
'B' % CIRC. LOAD		190%	

FIGURE 7
CLINKER GRINDING FLOW SHEET

Diesel-electric operated ladder dredge boat has several innovations in equipment. Four aggregate sizes are produced on boat

Produce Two Sand Sizes On Diesel-Electric Dredge

By BROR NORDBERG

Fifteen years ago A. H. Smith, Branchville, Md., sand and gravel producer, started to excavate material by wheelbarrows and teams of horses. Today he operates one of the best-equipped dredging operations in the entire East and is a factor in the ready-mixed concrete industry as well. In those fifteen years his operations have multiplied from a few tons of sand and gravel per hour to a dredging capacity of several hundred.

Mr. Smith not only handles the entire operating and sales end of the business but has designed and built his own dredge-boats. His first boat was a dipper dredge. He later designed and built an 8-in. pump dredge powered by steam and very recently built a ladder dredge of original design. The hydraulic dredge now is used to supplement the production of the ladder dredge which alone has a capacity of 1500-2500 tons of washed sand and gravel in 10 hours.

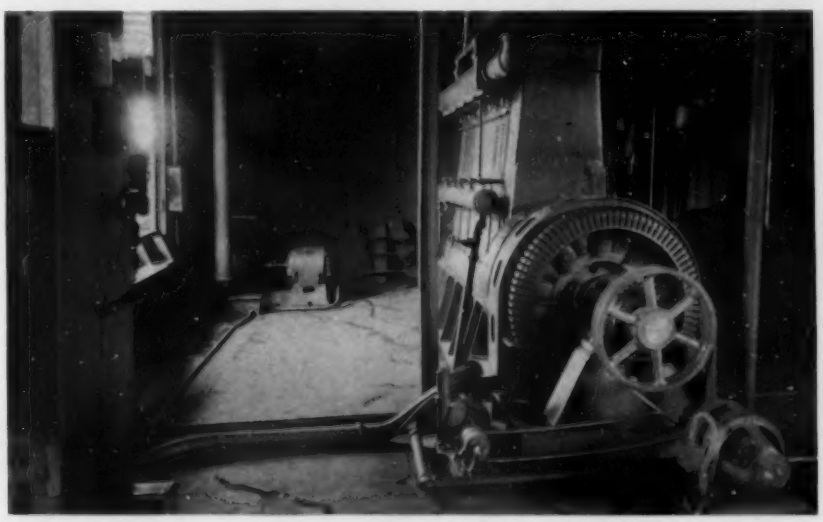
Produce Two Sand Sizes and Two Gravel Grades

Two types of sand and two grades of gravel are produced simultaneously for direct loading into barges. The new ladder dredge and the pump dredge are operated at different locations in a pit deposit containing wide variations in percentages of sand and gravel. Although the deposit is comparatively free from clay and other objectionable matter, it is covered with about 18 in. of topsoil. The overburden is excavated along with the sand and gravel by the ladder dredge but is stripped off ahead of the pumping operation.

In the overall deposit, gravel makes up about two-thirds of the recoverable product, but its occurrence is variable. By operating one dredge in one section of the deposit and the second in another, where the deficiency in sand in one is offset by a deficiency of gravel in the other, a balanced production is excavated. The deposit contains plenty of fines and very little plus 4-in. material.

Diesel-electric Power for New Dredge

Mr. Smith's new ladder dredge boat is electrified, with a Diesel engine-generator set to develop the power for independent motor drives. It is 30- x 80-ft. in plan, of bulkhead type construction, electrically welded with 5/16-in. steel plate for the sides and $\frac{3}{8}$-in. thick plate on the bottom, and the hull is 5-ft. in height. When digging, the boat draws about 4 ft. of water, loaded with fuel oil in the back end and water ballast forward. Fuel oil capacity, in two tanks is 7000 gal. An outside compartment in a bulkhead of

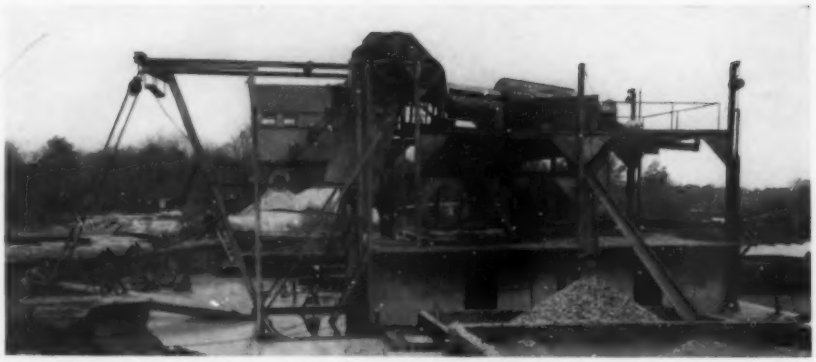


Diesel engine direct-connected to generator develops power for all the individual electric motors on new ladder dredge

4000-gal. capacity is used to cool the water circulated through the cooling chambers of the Diesel engine. A 2-in. Gould pump discharges heated water into this compartment and returns cooled water through the compartment plates into the engine.

Digging range of the dredge is to depths of 35 to 38 ft. with the buckets operating on a 35-ft. boom. The buckets, with manganese steel digging lips, each have a capacity of 4-cu. ft. of material. The drive is a 50-hp. slip-ring motor through a Link-Belt herring-bone gear reducer with nine possible speeds. Peak capacity is 2500 tons of material excavated in 10 hr., but bucket speeds are generally held down to produce 1500 tons of sand and gravel in 10 hours which contributes toward longer life of the digging lips. This capacity is supplemented by 800 to 1000 tons in 10 hr. excavated by the hydraulic dredge.

Gravel is separated from the sand through a revolving screen preceded by a revolving scrubber section. The buckets discharge first into a trough where water is added under pressure to wash the material evenly, which then moves in solution into the scrubber section. Water is introduced by a 6-in. American pump, having an 8-in. diameter suction, at the rate of 1200 g.p.m. under a pressure of 80 p. s. i. The scrubber-revolving screen (Link-Belt) is 48-in. diameter with a 7-ft. diameter sand jacket. The scrubber section is 8-ft. long, followed by 6 ft. of ¼-in. sq. perforations and 4 ft. of 1¼-in. sq. perforations. The sand jacket wire cloth has ⅛-in. sq. mesh (3 ft.) and ¼-in. sq. mesh (5 ft. 9 in.) to separate out the feed for the sand recovery equipment.



Two sizes of gravel and two of sand are produced simultaneously on ladder dredge, filling four barges. All chutes are rubber-lined

How Two Sand Sizes Are Produced

Concrete sand is produced from the minus ¼-in. feed in a 6-ft. Link-Belt automatic discharge sand cone. Minus ⅛-in. material through the sand screen and the overflow from the sand cone comprise the feed for a 9-ft. diameter Link-Belt Rotoscoop used to produce masons sand. This machine, ordinarily a sand dewatering device, is being used as a classifier and, eventually, its dewatering capacity will also be utilized.

The Rotoscoop consists of a rotating disc to which is attached renewable scoops for moving the sand inside a tank and adjustable plows above the disc which skim off the dewatered sand. The rotating scoops force the material above the water through openings in the disc to which the scoops are attached and "press out" the excess water.

In this particular plant, the principle of dewatering is not utilized since water is later added to wash the sand through a chute in direct loading of a barge. A conveyor of some type is to be substituted later in order to take advantage of the elimination of excess water from the sand. The machine operated at a slow speed, combined with the large settling area and washing action, produces a well-graded, uniform masons sand.

Volume of sand produced, and its grading, are varied by raising or lowering the overflow weir. By lowering the weir, fines are wasted, and mud, silt, grass, etc., encountered in some

Left: Revolving screen, showing sand screen for separating out the feed into the concrete sand and masons' sand machines below

Right: Below the revolving screen is a "rotoscoop" for the production of mason's sand. To the left of this machine, but not shown, is a settling tank for concrete sand

sections of the deposit are eliminated.

The quantity of water in the feed to the Rotoscoop, including the overflow from the 72-in. automatic concrete sand separator, is 900 to 1000 g.p.m. The masons sand product has a typical analysis as follows:

Screen size	Retained
100-mesh	97 percent
50-mesh	72 percent
30-mesh	10.5 percent
16-mesh	1.03 percent
8-mesh	trace

Overflow is practically all minus 100-mesh and contains considerable clay, fine roots and grass. Capacity varies, depending upon the analysis of the material being excavated, from 35 to 44 tons of masons sand per hour. The machine is driven by a 7½-hp. motor through a vertical helical worm reducer.

Dredge Loads Four Barges Simultaneously

Concrete sand and masons sand are finished products to be stocked in bins at the land plant, but the gravel is then rewashed and re-sized into bins. While excavating, the dredge boat loads four 70-ton barges simultaneously with masons sand, concrete sand, ¼- to 1¼-in. gravel and plus 1¼-in. gravel.

Steel chutes, through which gravel is passed into barges, are lined with a ¼-in. thickness of Cincinnati rubber in one continuous piece to guard against wear from abrasion. The lining is bolted to the chute at 6-in. intervals. After three months' use, no wear is evident on these linings, whereas high carbon steel chutes had a total life of three months in handling this material.

Power Plant

Electric power is developed on the boat by a 187½-hp., 5-cyl. Buckeye Diesel engine direct-connected to a 125 k.w., 156 kv. a., 240 volt alternating current generator (Electric Machinery Manufacturing Co., Minneapolis, Minn.). Excitation is furnished by a 5 k.w. d.-c. generator. Actual connected power in electric motors is 145½-hp. The load is variable for different demand conditions, but costs for power are less than ½c per k.w., computing the depreciation of the engine on a life of 10 years, which is very conservative.

To shut off the engine in event of failure of either the water or lubricating oil supply, the engine is equipped with a "silent watchman," an automatic safety device. A Curtis 3- x 1⅝- x 3-in. compressor develops compressed air at 200 p.s.i. to start the engine, and a Kohler light plant is provided for emergency lighting. The boat, which is equipped with push button control, has individual switches in the engine room and at the screening plant. A Clyde 3-drum hoist, driven by a 40-hp. motor through Link-Belt silent chain drive, is used in handling the spuds to anchor the dredge.

Loaded barges are towed to a dock at the storage bins and a Northwest crane with a 65-ft. boom and 1¼-cu. yd. bucket unloads the barges. Sand placed into bins is a finished product ready for shipment, and the gravel is re-sized and washed over a 3- x 5-ft. Link-Belt, double-deck vibrating screen. Oversize gravel is crushed through a 20-in. Traylor gyratory crusher. Total storage capacity is 1500 tons in 16 bins.

Aggregates for ready-mixed concrete are taken from these bins and cement is proportioned from a Blaw-Knox 650-bbl. bulk cement bin. There are 15 truck mixers, mainly 3-cu. yd. capacity, some of which are mounted on small trucks powered by Thornton tandem drives.

Preventing Mildew on Rubber Products

FOR YEARS everyone has known that cotton, linen and other fabrics which are allowed to lie in damp, dark places will acquire a mildew or mold growth. If the mildewed article is placed in a dry, sunlit room or outdoors in the sunlight, the mildew will disappear entirely, although a stain may remain.

Rubber articles that are partially composed of fabrics or cord and even rubber itself will show evidence of mildew under certain conditions. Cotton jackets of fire hose, if not thoroughly dried, may show extreme mildew growth during storage or even after use. Conveyor belts used in mines may show mildew growth on fabric plies if the belt covers are ruptured or stripped off.

The problem which has faced the manufacturer of rubber-coated fabric belts, conveyor belts, hose, etc., is that of so preparing the rubber article that the deleterious effect of mildew will be kept at a minimum. So far as is known, states R. V. Yohe, manager, general chemical laboratories, The B. F. Goodrich Co., mildew on a vulcanized rubber causes little harm, although extensive mildew growth over a long period of time on crude or unvulcanized rubber may very definitely injure it.

Mildew growth on cotton and linen fabrics causes loss in strength. All cotton goods, however, are infected with mildew since spores are continually being deposited in them from the atmosphere. These contaminating spores are extremely resistant to destruction by heat even at vulcanizing temperatures. The fabric from a piece of rubber-covered belt vulcanized for 30 minutes at 292 deg. F. will show mildew growth within two weeks after heating if kept under proper conditions of humidity and temperatures, even in a sterile atmosphere. Prevention of mildew growth therefore becomes the important factor.

The choice of a proper mildew inhibitor for use in the rubber industry is complicated by the fact that it must not be water soluble, it must vaporize readily, it must not have a strong or disagreeable odor, it must be reasonably inexpensive, it should not discolor, it must not activate or retard cure of rubber compounds, and it must not be deleteriously affected by heat, water, steam, and cold. A few of the commonly used materials for impregnating rubber articles are salicylanilide, chloro mercuri-phenol, thallium carbonate, p-nitro phenol, penta chloro phenol and its sodium salt, tetra brom beta napthol and p-chlor phenol. Crude pine tar and some of its fractions are particularly good inhibitors for certain species of mildew. Certain plant extracts and resins when properly treated with specific chemicals will inhibit the growth of other species of mildew. All of these methods and materials have been used by rubber manufacturers.

Silicosis Studies

NEW YORK STATE has probably made a more careful study of the silicosis problem than any other public authority in the United States. It is said to be the only state which has set up standards for investigating methods and equipment that fulfill requirements of the Industrial Board.

These rules classify rock into two divisions; (1) rock formations having a free silicon dioxide content which runs uniformly less than 10 percent by weight, and (2) rock formations having more than 10 percent of free silicon dioxide content or having a variable and unpredictable content of free silicon dioxide. Injurious silica dust concentration is defined as dust produced from drilling silica-bearing rock which is in excess of the following values as determined by an approved dust count method:

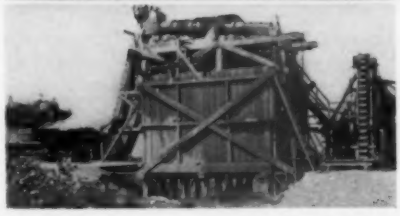
1—"One hundred million (100,000,000) particles per cubic foot of air as specified in No. 1 above).

2—"Ten million (10,000,000) particles (as specified by No. 2 above)."

All rock drilling operations must be executed so that there will be no dissemination of injurious silica dust concentration into the atmosphere. Dust control may be effected by suction or exhaust, and wet methods which may be invented or developed in the future, providing they are approved by the Board.

Quarry Methods Used In Sand and Gravel Pit

By NATHAN C. ROCKWOOD



Above: Porter Yett and his son, Frank. Center: Gravel plant, showing old mixer used as a washer. Below: Complete view of gravel plant

Knowing that friends back East were going to ask "What is Porter Yett doing now?" the editor on a recent Pacific Coast visit made it a point to look up Porter W. Yett, the very first thing on arrival in Portland, Ore. Well, Porter

Above: One of the mixer trucks. Center: Ready-mixed concrete batching plant with special hopper. Below: Close-up of divided hopper

Yett still has his basalt rock quarry but it wasn't operating, so Porter has gone into the sand and gravel business in a section of Portland that promises to be very soon developed—the northeast corner, right on the edge of the city. When Portland gets the next boom there is going to be a lot of home-building here, street pavements, etc.

To this new location Porter Yett has moved his ready-mixed concrete business—the whole operation is known as the Red-E-Mix Co. He is a pioneer in the ready-mix business and designs and builds his own truck mixers—the Paris.

"Quarry-Faced" Gravel Pit

"You will note," said Porter to the editor, "that I have opened my gravel pit just as I would a face of stone in a quarry. I wanted to find out just as soon as possible what I had; and I found the pit to vary greatly in amount and kind of material in various parts, just as nearly all similar pits do. Only a good many operators don't know what they are going to find until they have been digging for a long time."

This is a river or alluvial deposit and the various strata of material laid down are apparent from the exposed face. Such long exposed faces are not uncommon in old and large operations, but the editor had to confess that to start out this way with a small operation was unusual so far as he knew.

Home-Made Scrubber

The sand and gravel plant is not like the common ones. There are two distinct units, the dry screening plant and the wet screening plant. All material is washed and scrubbed. It is brought from the pit in motor trucks and dumped into a hopper which feeds the scrubber—the very first step. This scrubber is an old T. L. Smith 1½-cu. yd. concrete mixer, driven by a 15-h.p. LeRoy gasoline engine, which by means of a motor-car clutch operates the scrubber at three speeds. By manipulating the tilt and speed of the scrubber, the operator can get most any result he wants. The rest of the plant is driven by electric power.

The scrubber discharges through a perforated spout, which lets the silt and water flow into a flume to waste, and puts the washed sand and gravel in the elevator to the gravel screening plant. Thus instead of elevating all the raw material and subsequently disposing of the silt and dirt, the gravel and sand are elevated only after initial washing.

The gravel screen looks like a small cement kiln, being a single cylinder 36 in. in diameter and 29 ft. long. There is a scrubber section at the feed end, and then the sand section, then sections of increasing size perforations; in other words the screening is done as in a stone plant from fine to coarse, instead of the usual reverse method of a gravel plant.

Water and sand are flumed to the sand plant where the final washing and dewatering of the sand is done.

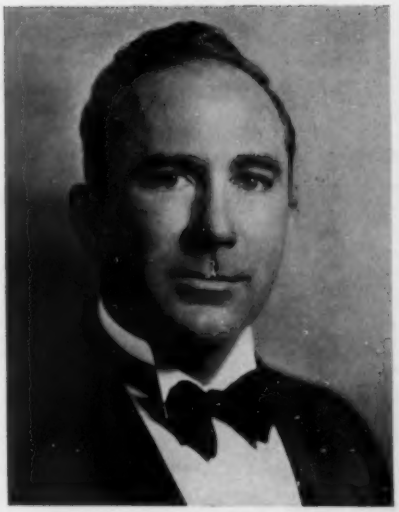
(Continued on page 46)

View showing "quarry-faced" gravel pit which was opened up to reveal the entire strata of the deposit

Crushing, Sizing, Testing, and Specifying Aggregates

Part 1. Introducing the Author and His Theme

By ELWOOD T. NETTLETON



Elwood T. Nettleton

The value of crushed stone produced in the United States annually amounts to over one hundred million dollars. Of this amount, approximately eighty million dollars' worth is used for concrete construction, road metal, and railroad ballast. The number of commercial crushed stone quarries in the United States was 1,453 in 1929 and 1,288 in 1937. Besides the value of the industry itself, over thirty million dollars a year in revenue is paid for transportation of this product from the quarry to the job. The plant investment of producers marketing crushed stone in Connecticut alone amounts to over eight million dollars.

Rock is usually divided into three general classes as igneous, sedimentary, and metamorphic. The various kinds of igneous rock most generally used are granite, basalt, and diabase, the latter two known as "trap rock." In the sedimentary rock classification limestone and sandstone are widely used. Metamorphic rock is very seldom satisfactory for construction aggregate.

Why Stone Is Tested

Experience has shown that in order to withstand certain destructive forces, either natural or man-made, stone must have certain inherent characteristics. These characteristics may be such as physical or chemical qualities of the rock, or cleanliness and sizing of the crushed product. The importance of any one of these characteristics is dependent upon the actual use to which the stone is to be subjected.

In order to ascertain whether any stone may or may not contain these desired characteristics, tests have been devised for the purpose of making this determination. These tests have been proposed, checked, and modified by various engineers from time to time and finally adopted as standard procedure for making the tests; adoption, as a rule, being approved by various national organizations. The American Society for Testing Materials has done notable work along this line.

With these standards as a background engineers who write specifications usually refer to these accepted tests as a basis of determining the characteristics they desire.

Types of Tests Used

There are numerous tests for various purposes. For convenience, the writer, however, is dividing the crushed stone tests into four general classifications:

Physical (not including gradation or cleanliness).

Chemical.

Cleanliness.

Gradation.

The most successful commercial crushed stone plants are erected, of necessity, at locations adjacent to large deposits of rock of uniform nature. Consequently, the physical and chemical characteristics do not vary from time to time. Therefore, tests to determine such characteristics are run but once a year. Should any divergence in chemical or physical qualities occur, it would immediately be noticed by observation, and tests would again be run.

Cleanliness is apparent to the eye. However, judgment of the gradation or sizing of crushed stone by the eye, or even by hand testing on the job, is extremely inaccurate. By a simple method of weighing, washing, drying, and reweighing, the exact amount of deleterious matter is obtained. Present rigid specifications require that certain percentages of material must be passed or retained on various test-screen openings. The accurate determination of these percentages is only possible by means of a large mechanical stone gradation testing machine.

Basic Foundations of These Articles

At the present time there is lack of definite knowledge by producers due to the many variables involved, and lack of agreement as to exact sizing and tolerances by engineers, causing more misunderstanding on gradation tests of stone than on any other stone tests. With this in mind, the writer has based the foundation of this series of articles on simplification and stand-

Meet Mr. Nettleton!

THE author of this series of articles is a graduate in civil engineering of Sheffield Scientific School, Yale University. He first served the aggregates industry on the receiving end as a member of the staff of the Pennsylvania State Highway Department. Subsequently he went into the producing end as an operating and engineering employe of the Connecticut Quarries Co. From that he graduated into sales work and became the company's sales manager. When the Connecticut Quarries Co. was consolidated with the New Haven Trap Rock Co., Mr. Nettleton became the latter company's western sales manager. He has served as president of the Connecticut Society of Civil Engineers, which recently honored him with a certificate of appreciation upon his retirement from office.

What the author has done through his own experimental work and investigation is to coördinate production and sales, so that a producer may have a clearer idea of what the engineer is trying to define or specify; and the engineer and user a clearer idea of what the limitations of practical processing are. In our estimation he has done this exceedingly well. So well in fact, that since this article was put into type we learn that Mr. Nettleton has been appointed engineering director and secretary of the New York State Crushed Stone Association. —THE EDITOR.

ardization of crushed stone specifications, with emphasis on sampling and testing stone for gradation.

By simplification of crushed stone specifications, the author means the requirement of a product practically and economically obtainable in commercial production. The specifications for describing the product desired are so written as to be easily understood without chance of diverse interpretation because of the personal element in judgment.

By standardization of crushed stone specifications, the author means the general agreement or acceptance by engineers at large of certain desired qualities and standard methods of testing for such qualities.

Both simplification and standardization would imply a reduction in present methods of specifying the physical, chemical, and sizing of crushed stone as well as the method of inspection, sampling, and testing of it to meet these requirements.

Objects of These Articles

The first object of this series of articles is to encourage producers to set up their own testing laboratory for the carrying on of gradation tests.

The methods used to advance this idea are:

(1) To make producers realize their present lack of knowledge.

(2) To point out some of the present faults of operation.

(3) To give to producers the results of tests, research, and observation carried on by the writer as a producer.

(4) To show producers the possibilities of improving the quality of their product and at the same time save considerable money by their own testing.

(5) To suggest further valuable research which producers might carry on through their own testing.

The second object of these articles is to prove to engineers and consumers the advantages obtainable to them of simplification and standardization.

These methods are used to advance this idea:

(1) To list for engineers and consumers some of the practical operating problems of the producer.

(2) To point out to engineers many of their faults in inspection, sampling, and handling of crushed stone by the consumer on the job.

(3) To prove, by tests, the practical limitations to which specifications may be written and still be met in actual daily commercial operation by producers.

(4) To point out the absurdity of certain variances in specifications and interpretation of specifications.

(5) To prove to engineers and consumers the advantages obtainable in service and quality by standardization.

The third object of this series of articles is to suggest that the only satisfactory solution will be found when both consumer and producer have a better understanding of the other's problems and limitations, and show a willingness to weld their viewpoints to the benefit of all concerned.

(To be continued)

Proposed Revision of Aggregates Specifications

A REVISION of Recommendation R163-36, Coarse Aggregates (crushed stone, gravel and slag) has been sent to the industry for approval and comment, according to an announcement by the Division of Simplified Practice, National Bureau of Standards. This recommendation, which establishes recommended sizes for coarse aggregates, was first promulgated in 1936. At that time two groups of sizes, which overlapped and duplicated each other to some extent, were deemed necessary to meet different local requirements. It is now recommended that only one group of sizes be used with the result that 12 sizes have been eliminated.

"GREEN SAND", high in Zeolite content, has been found along the Quintana road near San Antonio, Texas. This sand is used in water-softening processes and commands $15 a ton in Texas.

Quarry Methods Used in Sand and Gravel Pit

(Continued from page 44)

Four sizes of material are made, three gravel sizes and sand.

There is a hot asphalt mix plant on the property, but operated by another company.

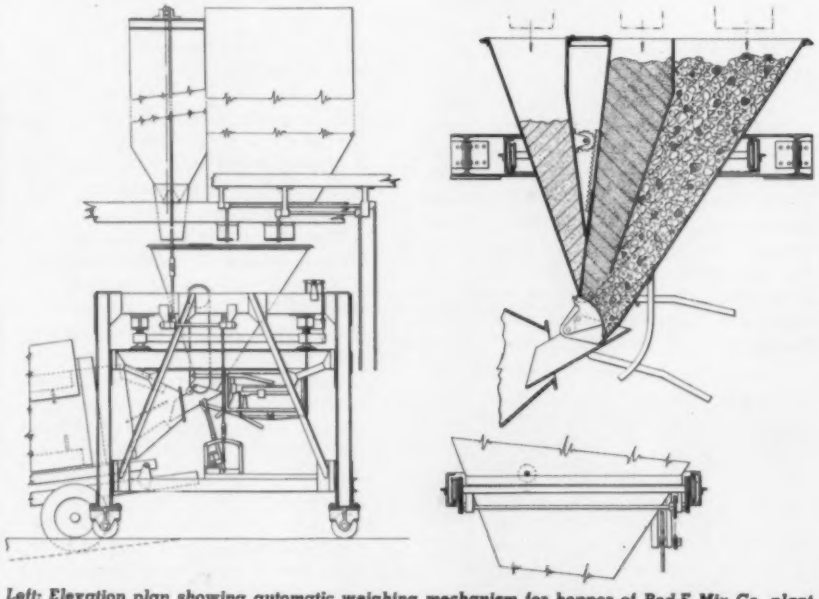
Ready-Mixed Plant

Sand and gravel are trucked from the plant bins to a detached ready-mixed concrete plant—or rather a batching plant, for transit truck mixers are used. The principal feature of this batching plant is a cone hopper designed and patented by Porter Yett, which does the weighing and the preliminary dry mixing of the cement, sand and gravel.

The essential features of this hopper are shown in the accompanying drawings. The first compartment is loaded with a weighed amount of gravel or stone, the next with the weighed sand, and the third the weighed cement. When the gate is opened the gravel flows out first, the sand flows into the gravel stream and the cement into the sand stream, the opening between the sand and cement discharges being adjustable, so that the flow of cement can be controlled. This scheme is designed to insure a thorough dry mix before the transit mixer starts its operation.

* * *

In conclusion, the editor can assure Porter Yett's friends that he is the same Porter, an irrepressible optimist and go-getter.



Left: Elevation plan showing automatic weighing mechanism for hopper of Red-E Mix Co. plant. Right: Details of special divided hopper designed to prevent segregation

Selecting Lubricants for Efficient Service

By BROR NORDBERG

Developments in lubricants and ways of applying them have progressed far in recent years and the operation has become safer and easier. The tendency is toward the use of more automatic methods in lubricating engines, motors and compressors by the use of splash and force feed systems; for more extended use of "grease-gun" systems with convenient fittings on the machines to force heavy lubricants under air pressure to various points, and in high temperature bearings to employ some type of mechanical or automatic lubrication using oil, rather than grease.

Equipment manufacturers as well as petroleum companies have done a lot of research and have devised bearings that simplify lubrication and afford greater protection against the dust, dirt and moisture contamination prevalent in the rock products industries. The raw grinding mills at the new Leeds, Ala., plant of the Universal Atlas Cement Co. are a good example of modern practice. Here, water-cooled babbitted bearings are fed from a central pressure oiling system. Another outstanding example, in a cement mill, is the modern clinker grinding mill of the Allentown Portland Cement Co. at Evansville, Penn. The mill bearings in this case are of special design to ease the starting load.

Before starting the mill, an oil pump forces oil under high pressure through openings in a shoe bearing, thus floating the tire bearing on a film of oil to reduce the starting inertia. When the mill starts to rotate, the oil pressure is shut off and the tire dips into a bath of oil to form a film of .005 to .010-in. thickness.

Pressure Systems

The use of such methods as the Alemite system with convenient fittings has a number of obvious advantages if properly used. Modern fittings on equipment prevent dust and abrasives from grinding bearings. A high pressure lubricating gun filled with a reputable lubricant pushes out dirt and abrasives, the lubricant acting as a seal against these destructive elements. Another advantage, and an important one, is the part that proper lubrication equipment plays in promoting safety where hazardous equipment parts such as transmission beltings, wheels, elevators, etc., are lubricated.

Materials Handling Equipment

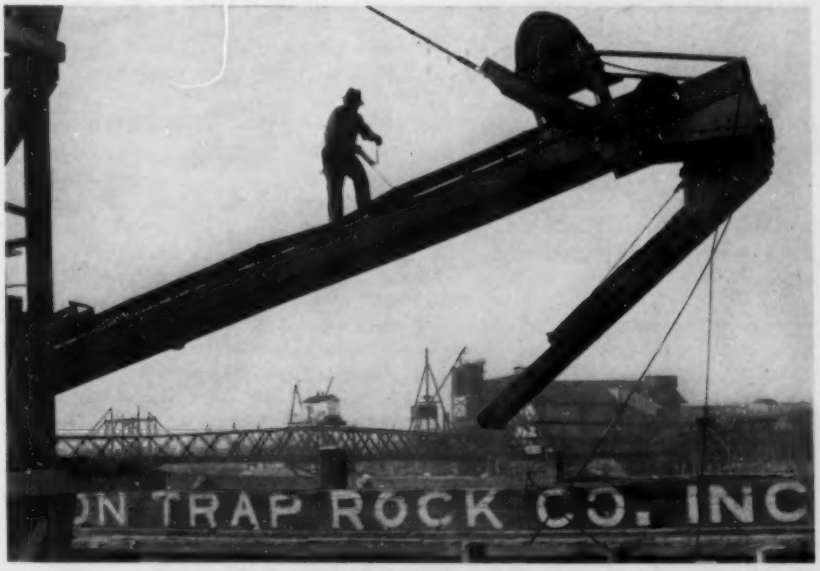
The Texas Co., New York, N. Y., devoted a recent issue of its technical publication, "Lubrication," to the lubrication of heavy duty materials handling equipment, which points out some developments of interest to operators of rock products machinery

It was pointed out in this article that modern materials handling equipment has been designed largely to eliminate dripping of lubricant, but in plants operating equipment of the older type, it has been necessary for the management to collaborate with the manufacturers of lubricants and lubricating devices to overcome any deficiencies which may prevail.

In the case of crane truck bearings of the railway type, usually lubricated with oil-saturated waste packing, a careful study has resulted in the conclusion that the use of waste and oil can be discontinued in favor of grease, using a product of pliable consistency. In some installations the grease is placed in specially designed pans and held against the journals by means of springs fitted to the underside of the pans. Grease can also be kept in close contact with the journal by using a weight and lever device. Grease lubrication also is practicable on cranes equipped with roller bearings.

Gears and pinions must be lubricated according to their design, housing and the means of lubrication available. Where cases are used for enclosure, it has been found that the smaller the amount of lubricant used to meet the conditions, the less trouble is experienced. After the teeth are coated very little gear lubricant is required to keep a film on them. The distance between the gear case and the gear or pinion should not be over ½-in.; ¼-in. would be the minimum. Straight mineral lubricants are best for this service, but their fluidity must be chosen according to the type of housing. A viscosity range in the neighborhood of 500 to 1000 seconds Saybolt Universal at 210 deg. F., according to atmosphere temperatures, will normally meet the requirements, where gears and pinions are housed in such a manner as to prevent leakage of the lubricant. In the case of non-oiltight housings, the use of a lubricant with as high as 5000 seconds Saybolt at 210 deg. F. may be necessary.

The conveyor designer has gone largely to the ball or roller bearing. In addition, he has studied pressure lubrication, bearing seals and methods



Lubricating conveyor belt idler equipped with pressure type fittings for application of grease

Crude method of circulating oil for gyratory crusher by lighting fire in oil drum

of grease application. Some roll sets are designed for lubrication from one or two points only: at the end of one or both of the side rolls, with provision for distribution of grease through suitable ducts to the bearings of the center rolls. By charging the bearing lubricating system at regular intervals, pressure can be built up from within to effectively prevent entry of abrasive or corrosive foreign matter. Application of the labyrinth seal to prevent entry of dust and dirt has improved lubrication effectiveness. The use of the cone-shaped seal capable of expanding when acted upon by the charge of grease under pressure from the grease gun also has been used. Lubrication in this manner, however, may lead to insufficient lubrication of the center roll if the lubricating system becomes air bound. Some authorities therefore prefer to lubricate the bearings of each roll individually by partial disassembly of the roll set at the time of lubrication. The apparent success resulting from this procedure is indicated by the reported necessity for relubrication but once every three months.

Standard Oil Co. (Indiana), Chicago, Ill., through its technical department, has published some engineering bulletins containing information on the lubrication of mining equipment, compressors and pneumatic tools that apply equally well to the rock products industries. Much of the information contained deals with recommended practices and precautions that should be exercised to lengthen equipment life.

In the bulletins, it is recommended that care be taken in the selection of oil for lubricating electric motors during cold weather. An oil with a low pour test is recommended to insure lubrication of the bearings as soon as they start to rotate. Rings on ring oiled bearings may become flat in one spot if too heavy an oil or one with too high a pour point is used in the winter under intermittent operating conditions. This flatness may be sufficient to keep the ring from turning even when the oil has become fluid again.

In motors equipped with ball bearings, where grease is used, it is necessary to select a grease with good low temperature starting characteristics to hold down starting torque, even though the lack of fluidity of the grease is of relative unimportance. For Diesel engine operation for a set number of operating hours in temperatures below freezing it is recommended that the lubricating oil be drained and replaced after heating when operation is resumed.

Considerable space in the bulletin, "Mining Equipment and Its Lubrication," is concerned with the proper lubrication and care of cables, sheaves and other accessory operating equipment used on shovels and draglines. New cables should be kept from dragging through water and dirt before and after lubrication and particular attention must be paid to proper lubrication between strands where the principal friction occurs.

The lubricant used should be one that will readily penetrate among the strands of the cable, to reduce friction and to prevent rusting inwardly, necessitating a lighter product in winter to guard against chipping off. The two classes of products commonly used are a mineral oil that may be applied cold and an adhesive, tacky petroleum compound applied hot, the latter method being generally preferable. Cable sheaves are generally equipped with compression grease cups or pressure gun fittings and should be lubricated about twice a day.

Mine Cars and Locomotives

The three main types of mine cars in use have the conventional self-oiling plain bearing, the railway journal type of bearing and roller bearings—the bearings being the main concern of lubrication. For the first type the main object is the use of oil or grease lubricant that is fluid enough to flow to the bearing surfaces. Railway journal type bearings are packed with waste and should be lubricated in cold weather with a low pour point oil in order to maintain the capillary action of the waste. Too thin an oil will leak excessively and a heavy oil would require excess power to start and haul the car. For ball and roller bearings the lubricant must preserve the fine finish of the parts and prevent rust.

The bulletin, in treating gyratory crushers using a circulating oiling system, recommends periodic inspection of the bearing. Excessively high temperatures, as evidenced when the hand cannot be held on it for several moments, indicates the oil level to be too low, dirt in the bearing, stopped up oil pipe or mechanical trouble. In extremely low temperatures, it is advised to operate the crusher for several minutes before the load is applied to allow the oil to warm up before high pressures are developed in the bearings. The bulletin concludes by suggesting that plant operators take precautions in the storage of lubricants to keep them uncontaminated and protect equipment from the action of moisture and weather during off-season times by the use of rust preventives.

Another issue of "Lubrication," the Texas Co. publication, devoted to lubrication in the field of contracting, deals considerably with the use of pneumatic equipment and other machines used in similar manner in the rock products industry. It is recommended that air compressor oils possess adequate viscosity for the operating temperature and show as low a tendency as possible to vaporize and cause accumulation of hard carbon residues. An oil having a wide range of distillation, high end point, or too great a viscosity is objectionable because it does not vaporize cleanly and will break down to become sticky. The viscosity of the compressor oil is related directly to piston seal and therefore to the efficiency of compression. An oil too light in body may work past the piston rings and impair the seal and a heavy oil may cause reduction in atomization or involve excessive internal friction.

(Continued on page 53)

Applying lubricant to crusher with grease gun

The Plant Superintendent

Adequate Recognition Not Being Given Lime Plant Superintendents

By VICTOR J. AZBE, *Consulting Engineer, St. Louis, Mo.*

It is not always the man in the limelight that counts, neither is it necessarily the owner nor president of the concern. Frequently there is a hidden personality, the superintendent, who not only is the driving force but the balancing wheel as well. Invariably, regardless of the ability of the president, when the superintendent is good the plant will be good, and somehow it seems that the superintendent is of greater importance than the president.

It is strange but it happens rather frequently that the superintendent is more devoted to the plant than the owner. He will work longer hours than anyone either up or down in the scale of positions. He will almost always take the plant problems with him to bed, often he will deliberately miss vacations, and if he takes them he will be happier on getting back than he was upon leaving.

Important as the superintendent may be, he seldom appears on the surface and is rarely seen at national gatherings. Although the man with the money may be featured in all sorts of ways, the superintendent ordinarily is thoroughly submerged and remains so through many years—years that for some may extend to half a century.

This lack of recognition seems to be unfair. If the industry is dependent to so great an extent upon the superintendent, then he should be more fully recognized. He should be catered to and invited to association meetings where he may be consulted. When he comes he may not present the appearance of the city slicker, he will not wear a tuxedo to the banquet, he may be hesitant about joining in the drinking bouts, he may not use confusing technical language; but after all, is that necessary? Is the fact that he is the man who makes the wheels turn for 24 hours out of 24 not sufficient to receive equal recognition with anyone; regardless of name, girth, prominence or money?

Through the many years of visiting lime plants, the writer has come to a realization that the most important personality to deal with is not the president, although he makes the changes possible, but rather the superintendent who makes them a success. Without the coöperative spirit of the superintendent, the consulting engineer counts for naught.

A most notable example of what a superintendent should be in his youth and through advancing years is Thomas

Thomas F. Robinson

F. Robinson, superintendent of the Beachville, Ontario, plant of the Gypsum, Lime and Alabastine, Canada, Ltd.

Mr. Robinson, who is now 71 years old, has been with Gypsum, Lime and Alabastine for 20 years, the first six years as superintendent of a dolomite finishing lime plant at Elora, Ontario. He then was transferred to Montreal where he erected and operated a gypsum plaster mill and board plant. The Gypsum Lime Co. purchased the Beachville White Lime Co. in the Spring of 1929 and transferred him there as superintendent. Before this he was superintendent for the U. S. Gypsum Co. plant at Alabaster, Mich., with which concern he was connected for 30 years or more.

To observe this most delightful old gentleman is a revelation as to what age should be. He certainly is keener of mind and as spry of step as most of those only half his age. His sense of humor is of the keenest, his laugh is infectious and could only be compared to the delightful effect from a glass of some old Spanish vintage.

Plant Efficiency Kept At High Level

But what of his plant? It is simpler than most plants, but the results are better than any of this type. I know of no high calcium kilns of hand-fired type that will give a monthly ratio of 3.9-1. There are many plants that have a ratio of only 2.5-1. Mr. Robinson does not obtain these exceptionally good results with any special aids, but from the most ordinary equipment, and through close attention, orderliness and system.

The Gypsum Lime and Alabastine, Canada, Limited, is a rather large and widely scattered concern. They make high calcium and dolomitic lime, gypsum, rock wool, glue, paint and these various plants are under different department heads. Mr. Robinson raised two of his sons to a point where they became qualified for these positions. One son, Jack, is head of nine plants, mainly lime plants. Another son, Leo, is head of all the gypsum plants. It seems incongruous for the father, the superintendent, to work for a son, the general superintendent; but who gets the credit for it? What father would not be proud of such capable sons?

While Mr. Robinson's plant at present is of a comparatively simple design, one of the most modern lime plants is being erected to replace the old unit. New shaft kilns are designed for complete control of temperature, very high capacity and efficiency, and for the most efficient labor conditions.

Such plants are complex, and the writer always has contended that beyond a certain age a man grounded in old practices cannot adapt himself to the intricate modern mechanism and thought. Mr. Robinson, however, controverts that contention fully; not only that, he was in complete step with the evolution of the design. He also was and still is most helpful with suggestions, and his interest is so great that no matter who or how many have worked on the project, the plant may be considered fully his and represents a crowning achievement of a long, productive and happy life.

LIME FORUM

Mr. Azbe is a contributing and consulting Editor of ROCK PRODUCTS. He will be glad to receive inquiries from his readers, and will answer these direct or through the columns of this Forum.

Estimation of Phase Composition of Cement Clinker

A method for estimating the glass content of portland cement clinker has been recently presented by Lerch and Brownmiller.[8] The glass which is present in a specified concentration may have a composition which is on one of the surfaces of the space model of the quaternary system, but it will not necessarily be on one of the quintuple lines or isotherms considered in the equations in Table 5. (ROCK PRODUCTS, February, 1939, pp. 47-48.) For example, the quantity of glass in a type A-1 composition may be greater than the quantity of liquid calculated for 1400 deg. (series 18-20, Table 5), and less than that calculated for 1450 deg. C. This would indicate that if the clinker was in a state of equilibrium when quenched, forming glass, the formation of glass occurred at some temperature between 1400 deg. C. and 1450 deg. C. The composition of the glass may be estimated approximately by assuming that the path of the liquid between the two isotherms is a straight line. This, in addition to the procedure of treating quintuple curves as a succession of straight lines, as in Table 5, provides a basis for the derivation of equations for direct computation of phase composition with an estimated percentage of glass. Equations for this purpose are given in Tables 6A and 6B, for types A-1 and B, respectively.

Only a single series of equations is used in a particular calculation. The group which includes the C/D ratio of the composition under consideration is selected first. The series of equations to be used is then found by selecting the series which includes the estimated value of G.

In Table 6A, series 34 represents the condition in which crystallization is occurring with the liquid at T_2 at the time undercooling occurs. That is, the glass is of composition T_2. In the remaining series in which the equations are in linear form, the glass is on the quintuple line T_2E. In those in fractional form, it is on the C_2S-C_2S surface.

In Table 6B, the glass in series 43 is at T_2. In the remaining series in linear form the glass is on the quintuple line T_2W. In those in fractional form, the glass is on the C_2S-C_2S surface.

Disposition of Magnesia. The quantity G in Tables 6A and 6B represents the estimated percentage of a glass composed only of CaO, Al_2O_3, SiO_2, and Fe_2O_3. If magnesia is present, the estimated percentage of glass, containing MgO, is not G, but may be designated as P. If it is assumed that the liquid is capable of dissolving 6.00 percent of MgO, the value of G may be calculated from P and M, the latter being the percent of MgO.

Table 6A—EQUATIONS FOR CALCULATING PHASE COMPOSITION OF CLINKER WITH AN ESTIMATED GLASS CONTENT—NORMAL CRYSTALLIZATION*
Type A-1 (C_4AF the disappearing phase)

	Series
Group 1. Crystallization at T_2	
Equations to be applied when glass content is less than the quantity of liquid present when C_4AF disappears, as indicated in Groups 2 to 5.	
$C_3S = A - 0.014G$	
$C_2S = B - 0.162G$	34
$C_3A = C - 0.322G$	
$C_4AF = D - 0.502G$	
Group 2. C/D between 0.64 and 3.33	
(a) G less than 1.99D	
Use equations in Group 1	
(b) G between 1.99D and (1.12C+1.27D)	
$C_3S = A - 1.19D + 0.58G$	
$C_2S = B + 1.05D - 0.69G$	35
$C_3A = C + 1.14D - 0.89G$	
(c) G between (1.12C+1.27D) and (1.11C+1.37D)	
$C_3S = A + \frac{17.06C + 10.15D - 10.82G}{8.10 - C/D} - \frac{0.16C - 0.07G}{D/C - 0.12}$	36
$C_2S = B + \frac{0.05G + 0.04C}{D/C - 0.12} - \frac{9.96C + 2.05D - 2.72G}{8.10 - C/D}$	
(d) G between (1.11C+1.37D) and (1.13C+1.46D)	
$C_3S = A + \frac{10.25C + 0.43D - 2.46G}{C/D + 5.13} - \frac{0.67G - 0.87C}{D/C + 0.19}$	37
$C_2S = B + \frac{0.48G - 0.68C}{D/C + 0.19} - \frac{4.12C + 2.67G - 4.70D}{C/D + 5.13}$	
Group 3. C/D between 3.33 and 4.71	
(a) G less than 1.99D	
Use equations in Group 1	
(b) G between 1.99D and 5.00D	
$C_3S = A - 1.19D + 0.58G$	
$C_2S = B + 1.05D - 0.69G$	38
$C_3A = C + 1.14D - 0.89G$	
(c) G between 5.00D and (1.14C+1.19D)	
$C_3S = A - 0.80D + 0.50G$	
$C_2S = B + 0.76D - 0.63G$	39
$C_3A = C + 1.04D - 0.87G$	
(d) G between (1.14C+1.19D) and (1.10C+1.40D)	
$C_3S = A + \frac{10.62C + 9.85D - 9.00G}{4.49 - C/D} - \frac{0.65C - 0.46G}{D/C - 0.22}$	40
$C_2S = B + \frac{0.43C - 0.24G}{D/C - 0.22} - \frac{7.13C + 5.36D - 4.51G}{4.49 - C/D}$	
(e) G between (1.10C+1.40D) and (1.11C+1.49D)	
$C_3S = A + \frac{0.61C - 0.43G}{D/C + 0.20} + \frac{13.02C + 6.14D - 6.59G}{C/D + 5.02}$	41
$C_2S = B - \frac{0.41C - 0.23G}{D/C + 0.20} - \frac{7.00C + 1.12D - 1.57G}{C/D + 5.02}$	
Group 4. C/D between 4.71 and 12.50	
(a) G less than (1.14C+1.19D)	
Use equations in Group 3 appropriate for the estimated value of G.	

*In this and succeeding tables, A, B, C and D refer to percentages of C_3S, C_2S, C_3A and C_4AF, respectively, as calculated by equations 1-5, and G refers to the estimated percentage of glass.

In the System $3CaO.SiO_2$-$2CaO.SiO_2$-$3CaO.Al_2O_3$-$4CaO.Al_2O_3.Fe_2O_3$ at Clinkering Temperatures

Part 7. Concluding Article

By L. A. DAHL

Research Chemist, Portland Cement Association, Chicago, Ill.

Group 4 (Continued) C/D between 4.71 and 12.50	Series
(b) G between (1.14C+1.19D) and (1.11C+1.49D)	
$C_2S = A + \frac{25.34C+20.36D-18.79G}{10.47-C/D} - \frac{0.28C-0.19G}{D/C-0.10}$	42
$C_2S = B + \frac{0.18C-0.09G}{D/C-0.10} - \frac{15.87C+9.89D-8.32G}{10.47-C/D}$	
Group 5. C/D greater than 12.50	
(a) G less than 5.00D Use equations in Group 3 appropriate for the estimated value of G.	
(b) G between 5.00 D and (1.14C+1.19D) Use equations in Series 39.	

Table 6B—EQUATIONS FOR CALCULATING PHASE COMPOSITION OF CLINKER WITH AN ESTIMATED GLASS CONTENT—NORMAL CRYSTALLIZATION
Type B. (C_3A the disappearing phase)

Group 6. Crystallization at T_2 Equations to be applied when glass content is less than the quantity of liquid present when C_3A disappears, as indicated in groups 7 to 10	Series
$C_3S = A-0.014G$ $C_2S = B-0.162G$ $C_3A = C-0.322G$ $C_4AF = D-0.502G$	43
Group 7. C/D less than 0.10	
(a) G less than 3.10C Use equations in Group 6.	
(b) G between 3.10C and 4.88C $C_3S = A+0.98C-0.23G$ $C_2S = B-0.88C+0.01G$ $C_4AF = D+0.90C-0.78G$	44
(c) G between 4.88C and 13.91C $C_3S = A+0.60C-0.25G$ $C_2S = B-0.43C+0.03G$ $C_4AF = D+0.83C-0.78G$	45
(d) G between 13.91C and (1.01C+1.29D) $C_3S = A+0.34C-0.23G$ $C_2S = B-0.13C+0.01G$ $C_4AF = D+0.79C-0.78G$	46
(e) G between (1.01C+1.29D) and (1.04C+1.37D) $C_3S = A + \frac{0.43G-0.40C}{D/C+0.36} - \frac{4.09G-2.59C-4.43D}{C/D+2.81}$ $C_2S = B + \frac{1.28G+1.22C-1.62D}{C/D+2.81} - \frac{0.79G-0.76C}{D/C+0.36}$	47
(f) G between (1.04C+1.37D) and (1.16C+1.43D) $C_3S = A + \frac{5.14G-5.10C}{D/C+1.78} - \frac{1.04G+3.21C-1.19D}{C/D+0.56}$ $C_2S = B + \frac{0.48G+4.77C-0.63D}{C/D+0.56} - \frac{6.92G-6.88C}{D/C+1.78}$	48
Group 8. C/D between 0.10 and 0.26	Series
(a) G less than 4.88C Use equations in Group 7 appropriate for the estimated value of G	
(b) G between 4.88C and (1.07C+1.28D) Use equations in series 45.	
(c) G between (1.07C+1.28D) and (1.04C+1.37D) $C_3S = A + \frac{13.65C+3.43D-3.46G}{3.13-C/D} - \frac{2.14G-2.19C}{D/C-0.32}$ $C_2S = B + \frac{2.46G-2.51C}{D/C-0.32} - \frac{11.52C+0.30D-0.33G}{3.13-C/D}$	49

If M is greater than 0.06P, G = 0.94P, and free MgO = M — 0.06P.

If M is less than 0.06P, G = P — M, and free MgO = O.

Disposition of the Alkalies. As previously mentioned, the alkalies may be assumed to increase the amount of liquid by an amount equal to the percentage of alkalies present. If alkalies are to be taken into account, the value of G must then be reduced by subtracting the alkalies before proceeding with the calculations.

Disposition of Free Lime. The equations in Tables 6A and 6B are based upon the assumption that a state of equilibrium exists when the liquid undercools to a glass, and that the glass has the composition the liquid would have in that particular state of equilibrium. The presence of free lime, in the range of compositions in those tables, indicates that a state of equilibrium did not exist when the glass was formed.

It should be noted that the departure of the liquid composition from that estimated for a state of equilibrium, indicated by the presence of free lime, cannot be evaluated at the present time. Since this departure increases with increasing free lime content, calculations of phase composition are increasingly doubtful as the free lime increases. The practice of subtracting free lime from total lime before calculating the values of A, B, C, and D to be used in the equations will improve the estimate of phase composition. It should be understood, however, that the presence of a high percentage of free lime introduces considerable doubt as to the value of the estimated phase composition.

Partial Independent Crystallization

If the liquid crystallizes independently, but ceases abruptly at some point, because of rapid cooling, the liquid will undercool, appearing as glass in the product. Independent crystallization has then not proceeded to completion, and the fact that it has occurred only partially must be taken into account in estimating phase composition. Equations for estimating phase composition with partial independent crystallization are given in Table 7 for type A-1 compositions.

During the fusion of a composition in the system C_3S-C_2S-C_3A-C_4AF, the liquid follows a course which is sometimes outside of that system, either in the system CaO-C_3S-C_3A-C_4AF or the system C_2S-C_3A-C_5A_3-C_4AF. If the liquid is in the latter system, the normal process of crystallization requires chemical reactions involving the solid C_2S. If these reactions occur so slowly that they are negligible as compared with the rate of crystallization,

the liquid will crystallize in the same manner as it would if alone. It should be noted, however, that the C_3S primary phase volume extends into the system C_2S-C_3A-C_5A_3. Crystallization of the liquid as though it were alone, with none of the solid phases present which are formed during fusion, would still involve reactions with C_3S. If the reactions with C_3S are negligible, crystallization must occur as it would if the C_3S primary phase volume were removed, and the various surfaces in the system C_2S-C_3A-C_5A_3-C_4AF extended to meet in the gaps formed. This is the basis for the equations in Table 7.

The procedure which has been described is necessary in dealing with partial independent crystallization, as it is impossible for a solid to separate out before its limit of solubility is attained. For example a liquid on the 1400° isotherm on the C_3S-C_2S surface may have the composition 22% C_2S, 37% C_3A, 21% C_5A_3, 20% C_4AF. In crystallizing independently, the four phases will not separate out together, since the limits of solubility of C_3A, C_5A_3, and C_4AF are not attained. This is known from the fact that the composition is not inside nor on the boundary surfaces of the primary phase volumes of these phases. C_2S will separate first until a surface of one of these primary phase volumes is reached, then C_2S and a second phase, etc. It should be observed that C_5A_3 does not appear until crystallization is nearly complete. Thus, the presence of solid C_5A_3 is to be expected only with low percentages of glass, and may not appear at all.

Magnesia, free lime and the alkalies may be treated in the same manner as in Tables 6A and 6B, with the same reservations as to the validity of the assumptions employed.

At present, no basis is seen for calculating phase composition with partial independent crystallization of liquids in the system CaO-C_2S-C_3A-C_4AF. On that account, no table is given for type B, in which this type of liquid appears.

No information is available at present for determining whether crystallization occurs normally, as assumed in Tables 6A and 6B, or independently, as assumed in Table 7. It probably occurs in some intermediate manner. That is, the reactions involving C_3S during cooling may be slow, but not entirely negligible. The tables for the two conditions may provide a basis, however, for making the calculations required in the investigation of the problem.

[1]Lerch, W. and Brownmiller, L. T. Method for Approximating the Glass Content of Portland Cement Clinker. J. Research, U. S. Bureau of Standards, 18, 609 (1937), Research Paper No. 997. Paper No. 32, Portland Cement Association Fellowship, U. S. Bureau of Standards.

TABLE 6B (Continued) EQUATIONS FOR CALCULATING PHASE COMPOSITION

Group 8 (Continued) C/D between 0.10 and 0.26 — Series

(d) G between (1.04C+1.37D) and (1.16C+1.43D)

$$C_2S = A + \frac{5.14G-5.10C}{D/C+1.78} - \frac{1.04G+3.21C-1.19D}{C/D+0.56}$$

$$C_2S = B + \frac{0.48G+4.77C-0.63D}{C/D+0.56} - \frac{6.92G-6.88C}{D/C+1.78}$$ — 50

Group 9. C/D between 0.26 and 0.34

(a) G less than 4.88C
Use equations in Group 7 appropriate for the estimated value of G.

(b) G between 4.88C and (1.07C+1.28D)
Use equation in series 45.

(c) G between (1.07C+1.28D) and (1.14C+1.34D)

$$C_2S = A + \frac{4.74G-4.69C}{D/C+1.18} - \frac{3.09G+1.91C-3.68D}{C/D+0.85}$$

$$C_2S = B + \frac{2.24G+3.76C-2.83D}{C/D+0.85} - \frac{5.92G-5.87C}{D/C+1.18}$$ — 51

(d) G between (1.14C+1.34D) and (1.50C+1.45D)

$$C_2S = A + \frac{0.14G+12.48C-2.96D}{C/D+5.10} - \frac{1.47G-1.80C}{D/C+0.20}$$

$$C_2S = B + \frac{1.27G-1.60C}{D/C+0.20} - \frac{5.24G+6.38C-8.06D}{C/D+5.10}$$ — 52

Group 10. C/D between 0.34 and 0.64

(a) G less than 3.10C
Use equations in Group 6.

(b) G between 3.10C and (1.14C+1.26D)
Use equations in series 44.

(c) G between (1.14C+1.26D) and (1.14C+1.34D)

$$C_2S = A + \frac{1.80G-2.00C}{10D/C+0.10} - \frac{1.60G-2.21C-1.58D}{C/100D+1.58D}$$

$$C_2S = B + \frac{0.55G-1.16C-0.53D}{C/100D+1.05} - \frac{1.90G-2.10C}{10D/C+0.10}$$ — 53

(d) G between (1.14C+1.34D) and (1.50C+1.45D)
Use equations in Series 52.

Table 7—EQUATIONS FOR CALCULATING PHASE COMPOSITION OF CLINKER WITH AN ESTIMATED GLASS CONTENT. PARTIAL INDEPENDENT CRYSTALLIZATION Type A-1. (C_4AF the phase disappearing at T_2)

Group 11. Independent Crystallization from 1338°C. — Series
G less than 1.99D. Glass on RT_2

$C_2S = A - 0.027D$
$C_2S = B + 0.020D - 0.172G$
$C_3A = 0.013D - 0.329G$
$C_4AF = 0.994D - 0.499G$ — 54

Group 12. Independent Crystallization from 1400°C. C/D between 0.86 and 3.33

(a) G less than (0.79C—0.68D). Glass at R.

$C_2S = A + 0.66C - 0.57D$
$C_2S = B - 0.49C + 0.43D - 0.16G$
$C_3A = 0.41C + 0.51D$
$C_5A_3 = 0.42C - 0.37D - 0.54G$
$C_4AF = D - 0.30G$ — 55

(b) G between (0.79C—0.68D) and (0.31C+1.73D)
Glass on RT_2

$C_2S = A + 0.66C - 0.57D$
$C_2S = B - 0.49C + 0.42D - 0.17G$
$C_3A = 0.67C + 0.28D - 0.33G$
$C_4AF = 0.16C + 0.87D - 0.50G$ — 56

(c) G between (0.31C+1.73D) and (1.08C+1.34D).
Glass on C_2S—C_3A surface.

$C_2S = A + 0.66C - 0.57D$
$C_2S = B - 0.46C + 0.58D - 0.26G$
$C_3A = 0.80C + 0.99D - 0.74G$ — 57

(d) G between (1.08C+1.34D) and (1.11C+1.37D)
Glass in C_2S primary phase volume

$C_2S = A + 0.66C - 0.57D$
$C_2S = B + 0.34C + 1.57D - G$ — 58

Group 13. Independent Crystallization from 1400°C. C/D between 3.33 and 4.39 — Series

(a) G less than (0.80C—0.73D). Glass at R.

$C_2S = A + 0.67C - 0.62D$
$C_2S = A - 0.51C + 0.47D - 0.16G$
$C_3A = 0.40C + 0.55D$
$C_5A_3 = 0.44C - 0.40D - 0.54G$
$C_4AF = D - 0.30G$ — 59

Selecting Lubricants

(Continued from page 48)

For lubricating Diesel engines, an oil with a viscosity of from 65 to 85 seconds Saybolt at 210 deg. F. is recommended for temperatures above 20 deg. F. and a viscosity range of 300 to 550 seconds Saybolt at 100 deg. F. for temperatures below 20 deg. F. For gear lubrication, exposed, straight mineral lubricants are recommended with a viscosity range from about 600 to 1000 seconds Saybolt at 210 deg. F. A viscosity of about 180 seconds Saybolt at 210 deg. F. is suggested for enclosed silent chain drives. Mineral petroleum products without any fillers or thickening mediums are suggested for wire rope lubrication.

In a recent issue of "Mining and Metallurgy," Charles W. Frey, of The Esso Marketers, discussed the lubrication of various types of mining equipment which is digested in part. For air compressors of the type used in mines, a turbine-grade oil with a Saybolt viscosity of about 275 seconds at 100 deg. F. is considered satisfactory. The oil should be highly refined, low in carbon content and fed to the cylinders in proper amounts. According to Mr. Frey, most of the difficulties of compressor operation, including heavy carbon deposits, sticking valves, compression leaks and excessive temperatures can be traced directly to the use of excessive cylinder lubricant.

For mechanically-vibrated screens, using anti-friction, grease lubricated bearings, medium-consistency ball-bearing greases are recommended. Lime-soap-base greases or cup greases are not to be used since they will separate under service. The lubricants used for wire rope and cable must protect as well as lubricate and are usually the gear-shield type of product heated before application. These lubricants should not dry or flake off and be able to stand heat and cold without excessive melting or dripping and without being tacky enough to cause excessive drag as they pass around drums or reels.

On shovels and draglines, enclosed gears, especially on booms where they are subjected to great strains, graphite greases are not recommended since graphite will tend to settle in oil holes and prevent the flow of a lubricant to the gear bearings. Gear oils with extreme pressure characteristics such as are recommended for the hypoid gears on new automobiles are recommended.

For jaw crushers, heavy greases hand-packed against the bearings are advised, using high-melting-point soda-base greases or lime-base greases which resist the washing action of water, provided temperatures at the bearing are not high. Viscosities of 50 to 65 seconds Saybolt at 210 deg. F. for circulating oils are suggested for the lubrication of cone and gyratory crushers. The bearings of hammer mills, subject to abnormally high pressures, are lubricated successfully by using a specially compounded oil with a viscosity of about 60 seconds Saybolt at 210 deg. F. The compounding is of a type that imparts high film strength to the oil and enables it to carry shock loads without rupture of the lubricating film. A medium grade of machine oil or a medium consistency cup grease is recommended for slow speed, light-load ball, rod and pebble mills.

Jackhammers and similar air tools are generally oil-lubricated either from an oil reservoir in the head of the tool or from a lubricator placed on the air line. In the summer, moisture condensation in the lines causes trouble and a compounded oil that will resist the washing action of water is advised, with a viscosity of about 55 seconds Saybolt at 210 deg. F. The recommendation for winter operation is a highly refined straight mineral oil with a viscosity of 45 seconds Saybolt at 210 deg. F. and a pour point lower than the lowest expected temperature.

Group 13 (Continued) Independent Crystallization from 1400° C Series
c/o between 3.33 and 4.30

(b) G between (0.80C—0.73D) and (0.32C+1.71D)
Glass on RT_2
$C_3S = A + 0.67C - 0.62D$
$C_2S = B - 0.50C + 0.46D - 0.17G$
$C_3A = 0.67C + 0.31D - 0.33G$
$C_4AF = 0.16C + 0.85D - 0.50G$ — 60

(c) G between (0.32C+1.71D) and (1.08C+1.36D)
Glass on C_2S—C_3A surface.
$C_3S = A + 0.67C - 0.62D$
$C_2S = B - 0.47C + 0.61D - 0.26G$
$C_3A = 0.80C + 1.01D - 0.74G$ — 61

(d) G between (1.08C+1.36D) and (1.10C+1.40D)
Glass in C_2S primary phase volume
$C_3S = A + 0.67C - 0.62D$
$C_2S = B + 0.33C + 1.62D - G$ — 62

Group 14. Independent Crystallization from 1450°C.
C/D between 1.05 and 3.33

(a) G less than (0.71C—0.73D). Glass at R.
$C_3S = A + 0.60C - 0.61D$
$C_2S = B - 0.45C + 0.46D - 0.16G$
$C_3A = 0.47C + 0.54D$
$C_4A_3 = 0.38C - 0.39D - 0.54G$
$C_4AF = D - 0.30G$ — 63

(b) G between (0.71C—0.73D) and (0.28C+1.71D)
Glass on RT_2
$C_3S = A + 0.060C - 0.61D$
$C_2S = B - 0.44C + 0.45D - 0.17G$
$C_3A = 0.70C + 0.31D - 0.33G$
$C_4AF = 0.14C + 0.85D - 0.50G$ — 64

(c) G between (0.28C+1.71D) and (1.11C+1.36D)
Glass on C_2S—C_3A surface
$C_3S = A + 0.60C - 0.61D$
$C_2S = B - 0.42C + 0.61D - 0.26G$
$C_3A = 0.82C + 1.00D - 0.74G$ — 65

(d) G between (1.11C+1.36D) and (1.13C+1.46D)
Glass in C_2S primary phase volume
$C_3S = A + 0.60C - 0.61D$
$C_2S = B + 0.40C + 1.61D - G$ — 66

Group 15. Independent Crystallization from 1450°C.
C/D between 3.33 and 5.57

(a) G less than (0.75C—0.87D). Glass at R.
$C_3S = A + 0.64C - 0.74D$
$C_2S = B - 0.48C + 0.56D - 0.16G$
$C_3A = 0.43C + 0.65D$
$C_4A_3 = 0.41C - 0.47D - 0.54G$
$C_4AF = D - 0.30G$ — 67

(b) G between (0.75C—0.87D) and (0.30C+1.66D)
Glass on RT_2
$C_3S = A + 0.64C - 0.74D$
$C_2S = B - 0.47C + 0.54D - 0.17G$
$C_3A = 0.68C + 0.37D - 0.33G$
$C_4AF = 0.15C + 0.83D - 0.50G$ — 68

(c) G between (0.30C+1.66D) and (1.09C+1.36D)
Glass on C_2S—C_3A surface
$C_3S = A + 0.64C - 0.74D$
$C_2S = B - 0.44C + 0.69D - 0.26G$
$C_3A = + 0.80C + 1.05D - 0.74G$ — 69

(d) G between (1.09C+1.36D) and (1.11C+1.49D)
Glass in C_2S primary phase volume
$C_3S = A + 0.64C - 0.74D$
$C_2S = B + 0.36C + 1.74D - G$ — 70

Preventing Kiln Troubles By Finding Cause

Part 4

By W. S. DICKIE*

One of the most common troubles with tires is encountered in the older design of kilns where the tires were rigidly riveted through the supporting blocks, reinforcing band, and shell. Owing to differences in expansion and contraction between the shell and the tire, the heads on the tire rivets evidently popped off because of the tensile strain put on them. After a period of time it would have been possible for all the rivet heads to pop off and all supporting blocks become loose, which would make it necessary to shim the supporting blocks and rerivet the tire. This makes a rather costly job, because it is necessary to remove a certain portion of the kiln lining before the rivets can be replaced. This trouble undoubtedly led to the design of a tire in which no rivets are used and no solid connection is made between the tire and the shell.

Of course, the temporary cure for popping rivets is to shim the supporting blocks and rerivet the tire, but a more permanent cure can be obtained by changing the tire over to a rivetless type. To do this means the purchase of the necessary new and longer supporting blocks, together with side or keeper bars to prevent longitudinal movement of the tires. The old holes for rivets should be welded shut and the new tire fastenings welded to the shell. This makes it unnecessary to take out the fire brick lining. This method contemplates the use of the old tire and means the purchase of a minimum amount of replacement material but gives a job which is much more permanent than any other cure which might be tried.

Rivetless type of tire with welded construction

Correcting Grooving or Corrugations

Quite a common source of trouble in connection with tires is "grooving" of the tire or its supporting rollers. Most often this is caused by misalignment of the roller bearings, although it can be caused by a poor casting in either the tire or one of the rollers, the defect in the casting being either a soft or hard spot or a large blow hole. Owing to the fact that usually the tire diameter is not an even multiple of the roller diameter, the continual revolving of the tire and roller results in the tracking of either a hollow or a hump on the tire. Eventually this completes a circle around the tire. It seems strange but it is true that, even though this projection or depression is very slight, it is almost impossible to change the adjustment of the roller bearings. In addition, with the newer design of tire, whatever strain is put on the roller bearings in attempting to secure correct alignment results in an equal strain on the tire fastenings, sometimes to the extent that these fastenings are broken loose. The cure for the hollow or hump on the tire is the removal of the rollers and the facing off of the projection or depression on them. Usually if the corresponding projection or depression on the tire is not too great, the smooth roller faces will smooth out the tire face. If it is too great, the other cure is to face off the tire face as well, which is usually done by setting up a grinding wheel on the roller bearing bedplate and revolving it against the tire face as the kiln revolves.

Also, and particularly on dryers, coolers, or very special duty kilns, the tire faces sometimes become corrugated across their faces. These corrugations are due to several causes; one may be the falling of the load on the inside of the shell; the shell may be divided into quadrants which results in the load falling at set periods; or the corrugations may be caused by the synchronizing of two things, such as the falling of the load from tumblers and gear ring teeth may be in multiples. The only cure for this difficulty is to grind off the face of the tire with a grinding wheel set up on a stand as mentioned above.

Trouble May Be Due to Warped Shell

Under the head of troubles encountered with warped shells, an example was cited of difficulty with a tire which was really caused by a warped shell. It was the case where a warped shell resulted in uneven tire wear. Since the difficulty is more with the tire, in this case the cure is the installation of a new section under the tire. This warped shell condition, of course, increases the wear on the tire and roller faces, equally as much as misalignment of the roller bearings. At times operators have thought they were getting undue wear on tire and roller faces due to inferior quality of tires, when the undue wear was really caused by something other than the tire itself, such as a warped shell and misalignment of roller bearings.

Riveted type of tire on a riveted shell

Breakage of tires may be caused by several things. The most curious of which we have ever heard was a sudden cold rain that fell on a tire which was rather hot due to thin lining directly under the tire, causing the kiln tire to burst into three pieces. Of course, there is only one cure for a broken tire and that is the installation of a new one. Another cause for breakage of tires is the formation of an extremely hot spot directly under the tire, resulting in sudden expansion which the tire sometimes cannot stand. Again, the only cure is the installation of a new tire. However, where there is a possibility that a hot spot may form

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under or very close to the tire, some trouble may be avoided by punching rather large holes in the tire reinforcing band so that the shell itself can be seen through these holes. If a spot is seen to be getting hot, means can be taken to prevent it from becoming hot enough to do damage, but it is even more desirable to shut down the kiln and eliminate the cause of the hot spot.

An Emergency Repair to a Broken Kiln

Where a tire has been broken and it is absolutely necessary to run the kiln until a replacement tire can be secured, it is possible to hold the pieces together by installing a sort of linkage on the sides of the tire. There have been tires which were in two or three pieces but which have been run for a matter of six to seven weeks before replacement was made. The linkage referred to consists of a series of heavy curved bars, as heavy as is practicable, attached to the sides of the tires. These bars, which are segments, say six, eight, or twelve to the circle and arranged in two thicknesses on each side, are held in position by bolts or threaded rods through holes in the tire side walls. The links or bars are staggered so that there are, practically speaking, two solid rings, one on either side of the tire. This is by no means a cure for a broken tire but it does justify its use as an emergency repair.

Occasionally what appears to be a serious difficulty in connection with the tire, when finally run down, resolves itself into something which, after it is all over, is rather funny. A case in point is one where the tire showed all evidence of a circular crack extending the full circumference of the tire, at some points just a hair line and at others a rather deep crack. The writer was called to see the tire but by the time he arrived the cause was discovered. Some employee, probably a clean up man, had accidentally dropped a file so that it passed through between the tire and the roll and wedged in the pedestal in such a way that it formed a perfect cutting tool which was cutting the "crack" in the tire face. Naturally the "crack" rolled out after the file was removed and the kiln was revolved.

Riveted kiln shell section ready for shipment

Union Contracts Under the Wage-and-Hour Law

In an editorial in ROCK PRODUCTS, November, 1938, it was suggested that a 44-hour limitation on the work week might be overcome by contracting with employes to work up to 56 hours a week without overtime pay, provided their total hours did not exceed 1,000 in 26 weeks or 2,000 in 52 weeks. The federal wage and hour law apparently makes this possible.

Commissioner Andrews has recently made public his interpretation of these parts of the law, entirely arbitrarily. The courts may overrule him because he appears to have put into the law a great deal more than some others read into it. According to George P. Ellis, in the *Illinois Journal of Commerce*, the substance of Interpretation 8, shorn of its lengthy legal phraseology, is as follows:

(1) Employes under collective bargaining agreements are not exempt thereby (Sec. 4, Interpretation) unless:

(a) the agreement is more favorable than the law (Sec. 8, 9, Interpretation).

(b) the agreement is of the special type provided in Section 7 of the Law (Sec. 4, Interpretation).

(2) Existing union contracts *less* favorable than the wage and hour provisions of the Federal law, yield to the law. The contract is not controlling (Sec. 5, 6, 7, Interpretation).

(3) Existing union contracts *more* favorable than the law are not affected by the Act (Sec. 8, 9, Interpretation).

(4) Law Section 7: Labor contracts negotiated with bona fide unions recognized by N. L. R. B. which provide a maximum limit of 1,000 hours in 26 weeks, or 2,000 in 52 weeks, permit:

(a) Work in any week (work week or calendar) in excess of 44 hours up to 56 hours before the payment of time and one-half, provided the total hours *worked* in the half year do not exceed 1,000, or in the year 2,000 hours.

(b) Work on any day up to 12 hours without the payment of one and one-half overtime provided the total hours worked in the half year, or the year do not exceed 1,000, or 2,000 respectively.

(c) Hours worked in excess of 12 in one day or 56 in one week, paid at one and one-half rate, are counted in determining the 1,000 or 2,000 limit.

(d) Vacation periods, etc., whether or not paid, are not counted in "hours worked."

(5) Work in excess of the stipulated 1,000-hour or 2,000-hour limit abrogates the contract and all hours worked under the contract in excess of 44 hours in any week are subject to the one and one-half overtime rate plus penalties (Sec. 28, Interpretation).

(6) A Section 7 Contract can only be accepted where the employe is employed on an "annual basis" which guarantees

(a) a fixed annual wage, or

(b) continuous employment for 52 weeks or 2,000 hours pay in a year.

Conclusions

(1) The effect of this interpretation is to abrogate many labor union contracts. It not only destroys any agreement concerning hours, if the agreement is for more than 44 hours, but the Interpretation destroys also the flexibility of negotiated union contracts. In the average contract, it will not be possible for union leaders and employers to coöperate in staggering employment and otherwise adjusting contract terms to difficult operating conditions.

(2) Since the limited union contracts described under Section 7 of the law mean an average work week of 38.4 hours, such contracts are a practical alternative to the law only where:

(a) "up and down" employment from week to week would entail heavy overtime penalties under the law unless guaranteed employment be fully recognized.

(b) where "up and down" weekly employment on a *guaranteed basis* will under no circumstances exceed the 1,000 hours in 26 weeks or the 2,000 hours in 52 weeks specified in the union contract.

(3) Finding work for employes in the "off-season" to continue their earning power between the peaks of their regular employment will be impracticable under these limited contract exemptions if such off-season employment brings the total hours worked to more than 1,000 in 26 weeks, or to more than 2,000 in 52 weeks.

Experts Talk Lime

A. S. T. M. Symposium Brought Numerous Producers to Columbus, Ohio, March 8

By NATHAN C. ROCKWOOD

Under the auspices of the committee on lime of the American Society for Testing Materials, about 200 lime manufacturers, chemists, agricultural experts, and others interested met in Columbus, Ohio, March 8. Dr. James R. Withrow, chairman of committee C-7 on lime, A. S. T. M., and head of the department of chemical engineering, Ohio State University, presided. Eleven papers were read in abstract form. Afterward those who desired to do so visited the new research laboratory of the University.

Dolomitic Lime Putties

JOHN E. CONLEY, U. S. Bureau of Mines, Washington, D. C., speaking on "Variations in Properties of Dolomitic Lime Putties with Method of Hydration," gave the results of laboratory tests on three dolomites of similar chemical composition but of different chemical characteristics. Calcination of samples was controlled and recorded, such treatment being what would be described as "soft-burning" in commercial practice.

Hydration was by four different methods: (1) with large excess of water at several selected temperatures; (2) with theoretical amount of water to satisfy the CaO content without overheating; (3) with excess of water, added slowly; (4) same as (1) with various reagents added to the water. The resulting hydrates were examined for plasticity and settling rates. A general trend was shown for both putty volumes and plasticity indexes to increase with a decrease in settling rate.

Mr. Conley's conclusions did not appear to be particularly new or startling. Briefly some of these were: (1) properties of putties depend on the inherent properties of the original stone; (2) properties are affected by calcination history and hydration conditions; (3) plasticity increases with temperature of hydration up to approximately 90 deg. C.; (4) more plasticity with water in excess of that for theoretical amount required by CaO; (5) sodium salts in hydration water decrease plasticity, alter putty volumes and affect hydration reaction; calcium and magnesium chlorides have little effect on plasticity, but increase rate of hydration and decrease putty volumes; acetic acid improves plasticity and increases putty volume; (6) control of calcination so as to leave magnesia in an active form for complete hydration is desirable to produce a finishing hydrate.

Need Magnesium Limes Be Hydrated?

There has been quite a battle in recent years between magnesium lime manufacturers and the National Bureau of Standards as to whether the magnesia in magnesium and dolomitic limes ever hydrates, and what, if anything, happens to mortar or plaster if and when it does hydrate. On the solution of this problem hinges the fairness of the autoclave test for limes now being used by some bureaus of the federal government; for magnesia does hydrate in this test, causing alleged "unsoundness" in the lime.

F. C. WELCH, chemist, The Western Lime and Cement Co., Milwaukee, Wis., discussing "The Hydration of Magnesium Lime and the Autoclave Test," gave the results of exposure tests of brick work laid up in mortars containing magnesium limes. In two of the mortar mixtures the magnesia was hydrated in an autoclave before being used. Base-coat plaster mortars and finish-coat plaster were tested in pots 4 in. square.

Hydrates were made from lime burned under known conditions of time and temperature, and it was noted that magnesia hydrates more readily in light-burned (soft-burned) lime; and that time, temperature, size and composition of the stone have an effect on the rate of hydration. However, Mr. Welch did not consider hydration of magnesia essential, claiming there did not appear to be any relation between the action of unhydrated magnesia in mortar and plaster in the autoclave and its action under the several aging conditions described in his test data. More magnesia is hydrated when large batches of lime are slaked than in the case of small batches, due probably to the retention of heat in large batches. The delayed hydration of magnesia in mortar joints caused no noticeable expansion or harmful effects, according to Mr. Welch.

Lime for Glass

A. H. NIEMAN, chemist, Ohio Hydrate and Supply Co., Woodville, Ohio, outlined the character of the glass industry's demand for lime (less than 0.15 percent iron oxide and very low ignition loss); then answered briefly the question: How can manufacture affect the properties of lime? He said he had seen kiln temperatures in vertical kilns vary from 1600 to 2600 deg. F. When burning building lime the temperature should be as low as practicable, while a lime for the glass industry should be hard burned.

When making hard-burned lime, temperature control is important because high temperatures and especially great fluctuations in temperature are apt to cause a fluxing action between the lining of the kiln and the lime, resulting in small particles of fused material contaminating the lime ("seeds"), which is fatal to good glass production. By use of pyrometers and careful supervision, some manufacturers have been able to keep kiln temperature variations between 50 and 100 deg. F.

Milks of Lime in Industry

D. E. WASHBURN, chief chemist, American Lime and Stone Co., Bellefonte, Penn., discussed "Factors Affecting Milks of Lime Employed in Industry." He gave the results of an investigation designed to throw some light on the effect of hard burning high-calcium limestones on the settling rates of the resulting limes. Both vertical (shaft) kiln and rotary kiln limes were studied.

Settling rates on seven samples of lime were recorded, from 5 min. to 24 hr.; also the final volume of solids. The slowest settling lime and the one containing the largest volume of solids (putty) was a mildly (soft) burned rotary kiln product of a dense stone. Two samples of hard-burned rotary-kiln lime from a porous stone were relatively slow settling as was the mildly burned shaft-kiln product of a dense stone. Using the best lime as a standard it was possible to develop an empirical formula for calculating the putty yield of the others.

Lime for Water Treatment

CHARLES P. HOOVER, chief chemist, Columbus Water Works, Columbus, Ohio, had prepared a paper on "Quality of Lime Desired for Water Treatment," which was read in his absence. After briefly describing the function of lime in water treatment, and stating

that either oxide or hydrate could be used, the author emphasized the importance of the type of continuous feeder for the lime dosage, and how the kind of lime (lump, pebble, pulverized) was determined by the feeder, or vice-versa.

Hard-burned lime, because it slakes too slowly in cold water, is undesirable. The only essential test for water-treatment lime, in the author's opinion, is that for available calcium oxide. Accordingly, purchase specifications should be drawn with that in mind, and this is done by a system of penalties or bonuses based on 85, 88 or 90 percent water-soluble calcium oxide. Such a specification has been used by the city of Columbus, Ohio, for 30 years. The bonus clause reads:

> Bids will be received for lime on the basis of 88 percent water-soluble calcium oxide. It is hereby agreed that the city shall pay a bonus of 1½ percent of the contract price per ton for each 1 percent by which the water-soluble calcium oxide in any carload lot delivered, or one day's hauling by truck, shall exceed 88 percent, and shall deduct a penalty of 1½ percent of the contract price per ton for each 1 percent by which the water-soluble calcium oxide shall be less than 88 percent.

Mr. Hoover described three methods of determining percentage of water-soluble CaO. These are the Ellm's test, the sugar test, and the Scaife method (A.S.T.M. Methods C25-29). He thought the Ellm's and sugar tests reliable and much easier in manipulation.

Lime in "Threshold" Water Treatment

The paper of Owen Rice, Everett P. Partridge and R. E. Hall, of Hall Laboratories, Inc., Pittsburgh, Penn., outlined by Dr. Hall, had the impressive title "Prevention of After-Precipitation in Lime-Treated Industrial and Municipal Waters by Threshold Treatment." Threshold treatment is adding sodium hexametaphosphate (a proprietory chemical) to water that is to be treated for softening. It is claimed that 1 lb. of this metaphosphate in a million pounds of water will prevent precipitation or deposit of the calcium carbonate scale in pipes, etc. Why it will do this chemists do not yet know, but apparently this minute solution prevents calcium carbonate from crystallizing out of solution. It was said it would prove helpful in overcoming some of the objections to the use of lime in water treatment.

Lime (and Limestone) in Agriculture

Elmer O. Fippin, department of agricultural relations, Tennessee Valley Authority, Knoxville, Tenn., gave quite a comprehensive address on the use of lime in agriculture: "Soil Acidity and Liming, and Some Factors That Should Determine the Standards for Lime for the Soil." After briefly tracing the history of soil liming, Mr. Fippin described the nature of soil acidity and what it means in the soil treatment. But, he said, the function of lime in soil treatment was not merely to correct soil acidity, but to do all these also: (1) to supply available plant nutrients and regulate the availability of others, and physiological operation of the plant; (2) suppress the effect of toxic agents in the soil and plant; (3) increase the availability of essential nutrients; (4) control disease conditions; (5) improve the physical condition of the soil.

Mr. Fippin, who once was secretary of the National Lime Association, recalled the old controversies over lime vs. limestone and high-calcium vs. magnesium limes, and said that since calcium oxide or calcium hydrate placed on the soil reverts in a few days to the carbonate (stone) form, it makes little difference what form is used, except that it should be the most economical under local conditions. Similarly there is little choice between high calcium and magnesium limes, since the magnesium is never present in harmful quantities; and, on the other hand, magnesium is a vital constituent of the green coloring matter in plants. Also, magnesium limestones are better adapted to mixing with superphosphate fertilizers.

R. M. Salter and C. J. Schollenberger, department of agronomy, Ohio State University, Columbus, in a paper, "Criteria for Evaluation of Agricultural Ground Limestone," gave some data on particle size and corresponding surface areas per liter of soil and distances between particles (average) when one ton per acre was used to plow depth. [Since this table might also prove interesting to those who wish to investigate the relative surface areas of concrete sands, it is reproduced here.—Editor.]

NUMBER OF LIMESTONE PARTICLES AND TOTAL SURFACE OF PARTICLES PER LITER OF SOIL AND DISTANCE BETWEEN CENTERS OF LIMESTONE PARTICLES, ONE TON PER ACRE TO PLOW DEPTH

Diameter of Limestone Sphere		Sieve Mesh	Particles per Liter	Total Surface		Distance Centers, mm.
In.	Micron			Sq. mm.	Ratio	
0.394	10,000	2	1	314	1	100
0.197	5,000	4	8	628	2	50
0.098	2,500	8	64	1,256	4	25
0.049	1,250	14	512	2,512	8	12.5
0.025	625	24	4,096	5,024	16	6.3
0.013	313	42	32,768	10,048	32	3.1
0.006	156	100	262,144	20,096	64	1.5
0.003	78	200	2,097,152	40,198	128	0.7
0.0015	39	325	16,777,216	80,396	256	0.4

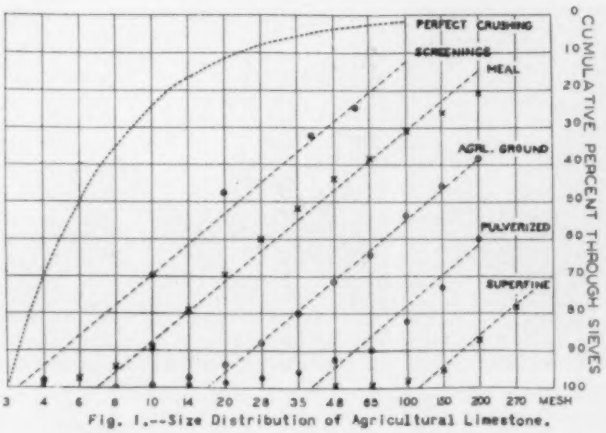


Fig. 1.--Size Distribution of Agricultural Limestone.

Ohio uses and defines five grades of limestone — screenings, meal, ground, pulverized and superfine. Each has approximately a straight-line gradation as shown in the accompanying chart.

Fluorine in Lime

C. J. Koehler, chemist, National Gypsum Co., Buffalo, N. Y., described in detail a method of laboratory analysis to determine very small percentages of fluorspar. This is assuming considerable importance in the case of lime for water treatment and for the food industries.

Lime Manufacture

Victor J. Azbe, consulting engineer, St. Louis, Mo., reviewed and brought up-to-date his "Fundamental Mechanics of Calcination and Hydration of Lime and Methods of Control." He emphasized that the chemical reactivity of lime depended chiefly on preserving the original volume (and a similar atomic structure) of the limestone. This means avoidance of hard burning, slagging with impurities, recarbonation, etc. He said limes may be divided into three groups: (1) perfectly burned, extremely rare; (2) under-burned; (3) over-burned. Both the latter have low avail-

(Continued on Page 86)

Practical Programs Asked

John J. Earley, Concrete Craftsman Extraordinary Addresses American Concrete Institute

By NATHAN C. ROCKWOOD

Frank E. Richart, new president of the American Concrete Institute

Readers of ROCK PRODUCTS who belong to the American Concrete Institute, and those who produce concrete materials could well belong, probably will welcome the remarks of John J. Earley, retiring president, at the Institute's annual convention in New York City, March 1-3. Mr. Earley, of Washington, D. C., is the country's outstanding craftsman in the construction of beautiful creations in concrete—colored concrete in well known works of art and architecture, particularly. Mr. Earley said the Institute had been drifting into research and programs on the technology of cement, aggregates and design of concrete too much to the exclusion of the craftsman's problems of the actual, every-day manipulation of concrete.

Probably through President Earley's influence the program of this convention contained several papers and discussions more nearly designed to fit this part of the Institute's function than usual. The first day's sessions were devoted entirely to discussions of highway concrete; and at last some of the faults of concrete pavements are beginning to be discussed in the open and solutions sought, as never before. There are good reasons for this because the trend of highway improvement in the last few years has been, in many instances, toward bituminous types; not entirely, however, because of faults found in some concrete paving, but because much of recent highway improvement has been with cheaper types of surfacing on less traveled roads.

Highway Concrete

C. B. MCCULLOUGH, assistant state highway engineer, Salem, Ore., in discussing "Maintenance and Repair of Bridges," told of the experience of the Oregon State Highway Department with bridges of wood, steel and concrete under all conditions from the desert country in the eastern part of the state to the humid coast region. The cost of maintaining concrete bridges has averaged 20c per ft. per year, which is much lower than the average for any other material.

Mr. McCullough described two types of concrete failure: (1) Wide cracking in what seems sound concrete, (2) disintegration that begins with a maze of hair-line cracks but works in deeper and deeper. In the case of some failures of the first type, investigations had largely eliminated the aggregates as the cause and led to the supposition that unsound cement was a factor. As this particular cement was low in MgO, it is suspected that the unsoundness was caused by delayed hydration of CaO. As a result, the Oregon State Highway Department has adopted the autoclave test in hopes of eliminating this cause.

The cause of the second type of failure was probably the use of unsound aggregates in some instances, although faulty placing and curing, particularly in the case of desert structures was responsible in other instances. Under these conditions (faulty aggregates or workmanship) cements high in tri-calcium-aluminate and low in iron content seemed to give the worst results. The heat of hydration was a factor as in the hot desert country it was impossible to provide the best water-cement ratio for dense concrete or to cure properly the fresh concrete. For such construction the state now uses a moderate heat portland (Federal Bureau of Procurement Specification SS-206).

Pavement Design

E. F. KELLEY, chief, division of tests, United States Bureau of Public Roads, Washington, D. C., in his paper, "The Application of the Results of Research to the Structural Design of Concrete Pavements," brought together under one head a lot of facts established by research, some of which have been largely ignored in practice. His paper will make a good sized book, but one that should be studied by those interested in construction of concrete highways.

F. H. JACKSON, senior engineer of tests, U. S. Bureau of Public Roads, discussed

Left: J. C. Pearson, past-president of the American Concrete Institute. Center: Harvey Whipple, secretary; J. R. Fairman; and Dr. F. R. McMillan, past-president. Right: T. C. Powers of the Portland Cement Association and P. H. Bates, National Bureau of Standards

"Curing of Concrete Pavements," which aroused a lot of discussion; but this subject is of primary interest to engineers and contractors rather than material producers.

Concrete Durability

All of a long evening session, through which a large and interested audience sat, was devoted to discussions of "Concrete Pavement Durability." Two of the papers read had more to say about design than durability, but the discussions were helpful nevertheless.

ELMER LAWTON, deputy commissioner of highways, State of New York, gave an historical resumé of experience and investigations in his state, where some concrete pavement defects have received wide notoriety. In seeking causes, sand fine aggregates were first investigated, as a result of which New York State probably has the toughest sand specifications a producer anywhere has to meet. Coarse aggregate was also investigated, but came out with a cleaner bill of health.

The investigations then turned to the cement, and by 1935 it was decided that cements with high percentages of tri-calcium-aluminates and high in tri-calcium-silicates were somewhat responsible for these failures; and specifications were adopted limiting the percentages of these constituents. Mr. Lawton took occasion to remark that these investigations and the subsequent changes in cement specifications were discouraged by cement manufacturers and not at all encouraged by the U. S. Bureau of Public Roads. Possibly on account of this attitude, although Mr. Lawton did not say so, investigation turned to old structures made of Rosendale natural cement, which were found to be holding up well; and as a result the New York State Highway Department is now using mixtures of portland cement and Rosendale natural cement, with what are said to be, so far, very good results.

S. W. MARSHALL, chief engineer, Pennsylvania Turnpike Commission, formerly chief engineer, Pennsylvania Department of Highways, in his discussion of concrete pavement durability in his state, gave some facts about the various zones in which aggregates occur, good and poor. He pointed out that soundness of aggregate required closer control in some of these zones than in others. But, he said, aggregates alone do not account for failures. For example, too much manipulation of the surfacing may lead to scaling. Also, subsoil conditions vary in different localities. He urged the study of all factors by zone.

E. C. WELDEN, deputy state highway commissioner, Connecticut, judging by his discussion, had no serious concrete pavement maintenance problems. He said pavements constructed in 1914 and 1915 were still good, with evidence of many more years of useful life. At least some of these, it would appear, had been constructed on prepared sand and gravel sub-grades, which may account for their good condition. Discussion brought out that early Long Island concrete pavements were still in good condition. This experience of concrete pavement laid on sand, or sand and gravel subbases, which permit perfect drainage of the concrete during the setting and hardening period seems to be continuously ignored, yet in the writer's opinion, first expressed more than 25 years ago, it is a very important factor in the construction of "permanent" concrete pavements.

Study of Bleeding

T. C. POWERS, assistant to director of research, Portland Cement Association, prepared a comprehensive paper on "A Study of Bleeding" of concrete, which he outlined at the convention. It is too technical to attempt to abstract here, without the aid of his charts. Anyhow, he has made bleeding or water gain more understandable.

The other papers at the convention were designed more for the engineer and architect. One very valuable feature of these and previous conventions was an "off-the-record" discussion of various research projects. This discussion always results in a lot of questions and answers which are helpful to all who are attempting to keep up with cement and concrete technology.

Officers Elected

FRANK E. RICHART, research professor of engineering materials, University of Illinois, was elected president, succeeding John E. Earley. Other officers elected were vice-presidents, Rear-Admiral Ben Moreell, chief of the bureau of yards and docks, U. S. N., and R. B. Young, Hydro-Electric Power Commission, Toronto, Ont.; new directors, W. F. Thomson, ready-mixed concrete manufacturer, St. Louis, Mo.; R. W. Crum, director of Highway Research Board, Washington, D. C.; A. S. Douglass, Detroit Edison Co.; Lion Gardiner, vice-president, Jaeger Machine Co., Columbus, Ohio.

TO AID PANAMA'S HIGHWAY development program, a bank in Panama City, Panama, has opened an account known as the "Sack of Cement," and is asking Panamanians and resident foreigners to deposit 65c, the cost of one sack of cement. Funds collected will be used exclusively for the purchase of cement to pave the highway between Panama City and David, Panama.

Bureau of Mines Studies Quarry Blasts

AS A RESULT OF A STUDY by the Bureau of Mines, valuable information on the causes and effects of earth vibrations due to the firing of blasts in quarries is now available. The experiments were made in an underground limestone mine in which conditions could be controlled with more precision.

These tests showed that holes drilled to break gave less vibration than those drilled blind with too great a burden to break. This indicated that for comparison all shots must be made in holes that do not break. In all tests it was impossible to distinguish between tamped and untamped holes as measured by the vibrational effect. Change of shape of explosive charge had no affect on the seismic wave.

Shots made in isolated pillars gave frequencies, amplitudes, and speed of propagation similar to those made in a rib continuous to the recording station. There was evidenced, however, a decided difference in the shape of the waves recorded. In fact, as this matter of wave shape was studied more intensively, it was found that the position of a shot in the mine could be identified from the recorded wave shape.

When multiple shots were made from the same place but were delayed by intervals of 2 to 5 thousands of a second, there was no evidence of synchronism and magnified amplitudes. In all cases of such delayed shots the maximum amplitude recorded was never greater than the maximum from a single shot of the same explosive charge.

Comparisons were made with ten explosives of different physical characteristics. No definite conclusions could be drawn from these tests, although they indicated that explosives with a high detonating speed tended to give greater vibrational effects. Tests made between explosives of different percentage strengths resulted in no definite conclusions, although there was some evidence that the stronger explosives gave more vibrational effect.

Under controlled conditions in the mine, it was definitely determined that amplitude did decrease with increase in distance from the shot. The decrease is rapid at first but rather slow at greater distance. Amplitude increases with weight of explosive charge but not in direct ratio. The increase is comparatively rapid with the smaller-sized shots but is less between larger shots.

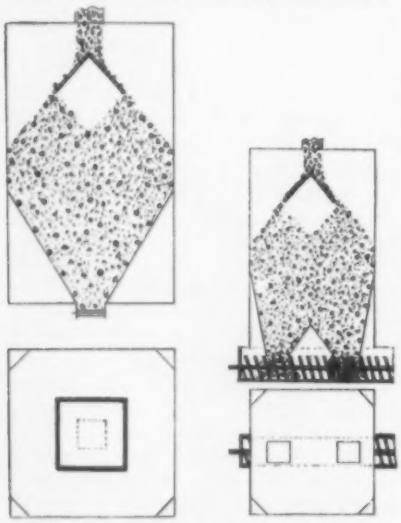
Some results of this study are summarized in Report of Investigations 3407, "Earth vibrations caused by mine blasting: Progress Report 2," by J. R. Thoenen and Stephen L. Windes, which may be obtained from the Bureau of Mines, Washington, D. C.

HINTS AND HELPS for Superintendents

Avoiding Segregation In Storage Bins

VARIOUS DEVICES have been described and illustrated in this department to prevent segregation of aggregates in bin storage, and each has its own advantages for certain applications. Illustrated herewith is another method of preventing segregation which may be useful to some plant operator.

Segregation is especially evident in storage bins where the bin is filled from a spout at the top and emptied from a spout at the bottom. The tendency is for the coarse particles to segregate at the outside of the bin so that when the bin is emptied, the fine materials are drawn off first and then the coarse materials.



Left: Plan and elevation of bin equipped with distributor in the form of a pyramid inserted in top of bins to prevent segregation. Right: Pyramid at the bottom used in connection with screw conveyor

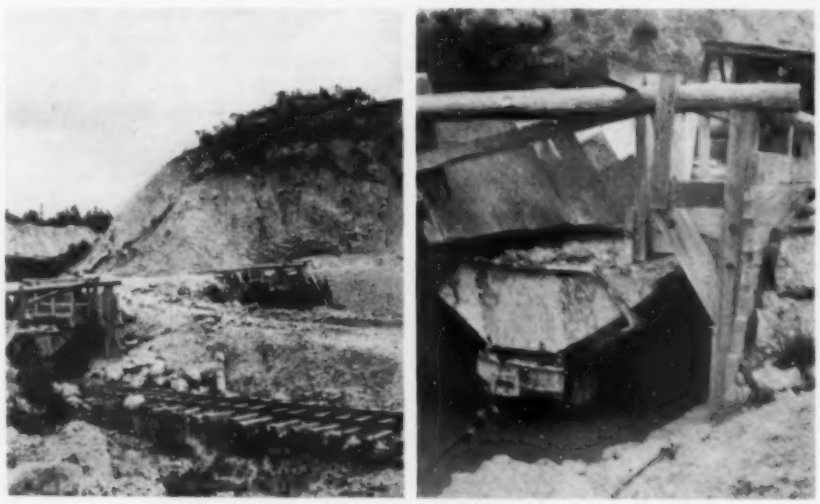
It has been found that this segregation can be minimized by placing a cone-shaped or pyramidal distributor in the bin directly below the spout through which the bin is filled. This distributor has the effect of making an annular ridge in the bin, rather than a cone, and causes the fine materials to segregate in a ring, with coarse materials on both sides so that the material is fairly uniform when drawn from the bin.

This segregation, states *Building Supply News*, can be reduced further, in fact almost completely eliminated, by the use of a second conical or pyramidal distributor near the bottom of the bin, and a screw conveyor discharge with several openings from the bin.

Combined Truck-Rail Haulage Increases Quarry Efficiency

ONE LARGE QUARRY IN THE SOUTH changed from all-rail to a combination of rail and truck haulage. The use of trucks in the quarry has been found to be a much more flexible operation where the stone is irregular in purity and structure. Originally the plant was designed for 7-cu. yd. Austin-Western dump (side) cars operating on a 36-in. gauge track and hauling up a grade by hoist to the crusher.

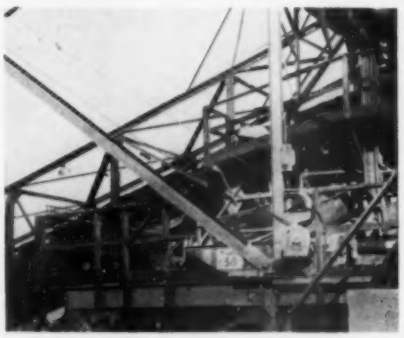
As it was not feasible to change the plant, the following new arrangement was made: Where the track comes down into the quarry and levels off horizontally (a distance of 300 ft.), a hopper was built of wood, one for each track. The top of each hopper is flush with the main quarry floor and the car and track are on a lower level. Trucks with 7 cu. yd. capacity bodies are now used to take the quarried material from the shovel to the hoppers. The trucks have the same capacity as the Austin-Western cars, and the hoppers were therefore built so that material is discharged directly into the cars below. Roads were built of the finer crushed stone and laid out so that trucks easily pass one another. Not only has the quarry operation been speeded up and made easier, but track does not have to be re-laid. Whenever a bad section of rock is encountered, shovel and trucks just move over to where there is better rock instead of loading inferior stone or waiting for track to be laid to this better rock. Rock is being hauled by truck upwards of 1000 ft. and by side-dump cars the remaining 300 ft. up the incline.



Left: Truck loaded hoppers on quarry floor empty into dump cars which are hauled up 300 ft. incline out of quarry. Right: Loaded car beneath hopper

Derricks Handle Repair Parts

EVERY OPERATOR at some time or other has experienced difficulty handling repair parts and replacements, especially when these have to be made on top of a screening plant superstructure. Some ingenious ones have added sticks to the booms of locomotive or caterpillar cranes or shovels and thus solved their problems. At the Radum, Calif., plant



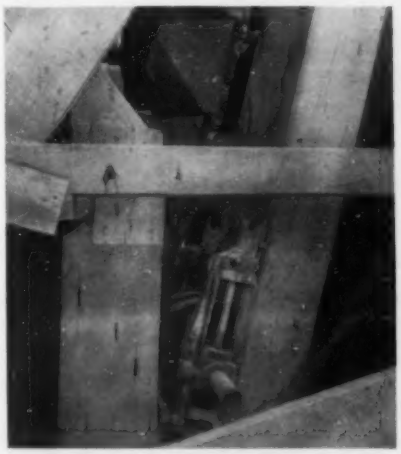
Steel derrick equipped with a small electric motor hoist

Single boom powered with a block and tackle and a hand winch

of the Henry J. Kaiser Co. this problem was foreseen and provided for by placing derricks on the plant where they would be most handy in raising and lowering repair and replacement parts. The steel derrick shown in one of the views is equipped with a very neat little electric motor hoist made by H. C. Wood, San Francisco. The other view shows a single boom powered with a block and tackle and a hand winch.

Change in Pulley Eliminates Chain Elevator Trouble

DELAYS AND SHUTDOWNS at the limestone plant of the Belmont Trap Rock Co., Staunton, Va., caused by chain elevators jumping off the tires when they become worn, have been largely eliminated by a change in the tail pulley.



Extra wide pulley with steel collars prevents chain from jumping off and becoming entangled in the machinery

A new tail pulley was made for the chain elevator, where normally the tires were about 7-in. apart and 1¼-in. wide. A pulley 15-in. wide was substituted with two steel collars, 1¼-in. wide and ½-in. thick, shrunk to the pulley. As the collar becomes worn and the chain jumps off, it will have the pulley to ride on until the condition has been discovered and corrected. Many plant delays have been eliminated and operations can still proceed until the operator has time to replace the worn collars.

Water-Pipe Railing

THE USE of a pipe hand rail for conveying compressed air to the top of a stone-screening plant has been described and illustrated in these columns, and now to complement that the picture herewith shows the use of a similar pipe rail as a water main to the top of a sand and gravel plant. This pipe, of course, is not used to supply the wash water, but to supply hose connections for special uses. This installation was noted at the Service Gravel Co. plant, Riverside, Calif.

Stair rail serves as water main at Service Gravel Co., Riverside, Calif.

Cleaner Packaged Products

UNIVERSAL ATLAS CEMENT Co. at Hudson, N. Y., is using a mesh conveyor, instead of the usual belting, to load portland cement in paper bags into barges at its river pack house. Purpose of the installation, for handling packaged products, is to permit any loose cement to fall away from the packages and to facilitate clean loading.

The conveyor is of the Cyclone Fence Co.'s (also a U. S. Steel subsidiary) chain design and is 24 in. wide. The direction of the weave in alternate sections is reversed, causing the belt to travel properly on the idlers. The idlers are single-piece and horizontal and the pulleys are of diameters commonly used with rubber belting.

Chain conveyor belt used in loading barge with cement bags permits loose cement to fall away from the packages

Bin Gates

SERVICE GRAVEL Co., Riverside, Calif., has cylindrical concrete silos resting on a flat slab of reinforced concrete, for loading motor trucks. The bin gates are square, cast-iron boxes, with a sliding plate opening, worked by levers from the side, which are within reach of a man at ground level. Since these gate boxes may break and need replacement, they are made to have a loose fit in the square opening in the bin floor and the gate assembly may be removed and another inserted.

Bin gates under cylindrical concrete silos are square cast iron boxes with sliding plate opening worked by lever

NEWS about People

L. A. WAGNER, chief research chemist of the Missouri Portland Cement Co., St. Louis, Mo., recently gave a talk before the Engineers' Club of Kansas City, Mo., on the subject, "Improvements in Cement as a Building Material."

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G. G. WADE was elected a director of Medusa Portland Cement Co., Cleveland, Ohio, to succeed the late A. C. Dustin. Other directors were reëlected.

•

R. R. LITEHISER, secretary and engineering director, New York Crushed Stone Association, has resigned to return to his former work with the Ohio State Highway Department.

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V. P. AHEARN, executive secretary, National Sand & Gravel Association, is one of the members of a committee appointed by the Construction Industry Conference, Chamber of Commerce of the United States, to work out effective methods of encouraging a larger volume of new construction throughout the country.

•

PAUL C. VAN ZANDT, vice-president in charge of operations and engineering, Universal Atlas Cement Co., Chicago, Ill., was a recent guest speaker before the Chicago section of the American Institute of Mining and Metallurgical Engineers, on "Modern Developments in the Use of the Wet Process in Cement Manufacture."

•

H. H. TITSWORTH was elected president of the Glens Falls Portland Cement Co., Glens Falls, N. Y., at the recent annual meeting of the company, succeeding J. Edward Singleton. He has been executive vice-president of the company since March, 1938. Mr. Singleton was elected vice-president and general counsel of the company, and R. C. Carter, secretary-treasurer. J. T. Phelan is superintendent. Directors elected include: H. H. Titsworth, Lowell R. Burch, J. T. Phelan, W. M. Bowden, T. C. Sherman, H. E. Harding, M. W. Maclay, D. B. Moynehan. Mr. Maclay is a cousin of the late Captain W. W. Maclay, who was the first president of the company. The new president, Mr. Titsworth, and Lowell R. Burch obtained an option to purchase a substantial interest in the concern two years ago. On December 28, 1938, Mr. Burch purchased a large block of stock held by a committee for the late George F. Bayle, Sr., former president, and also shares held by two Glens Falls banks.

•

FRANK GAUTIER, president and general manager of the Consolidated Rock Products Co., Los Angeles, Calif., has resigned as a director of the National Sand and Gravel Association. He will be replaced on the board of the association by Robert Mitchell, vice-president and secretary-treasurer of the company.

•

BERT E. MANLEY, who started with the Hawkeye Portland Cement Co., Des Moines, Iowa, as a stenographer, has been named general manager of the company, succeeding the late C. B. Condon. Mr. Manley has been acting general manager since January 26, 1938, and prior to that date he had been assistant to Mr. Condon. He has served as chief clerk and purchasing agent, and with the exception of a period during which he served in the world war, Mr. Manley has been with the company for 23 years.

•

OTHO GRAVES, president of General Crushed Stone Co., Easton, Penn., has been appointed a vice-chairman of the Committee on Relation of Government to Industry by Howard Coonley, president of the National Association of Manufacturers. The chairman of this committee is R. W. Moore, president of Canada Dry Ginger Ale, Inc., New York, N. Y., and co-vice-chairman with Mr. Graves is W. F. Harrah, chairman of the National-Standard Co., Niles, Mich.

•

E. P. KEARINS has succeeded John Denison as sales manager of the National Mortar and Supply Co., Pittsburgh, Penn. Mr. Denison is now representing the company in Florida. Mr. Kearins has been with the company since 1924, and its western sales manager since 1927.

•

RUSSELL M. L. CARSON was elected president of the Jointa Lime Co., Glens Falls, N. Y., at the recent annual meeting. Other officers are: Frank J. Crowe, vice-president; H. J. Russell, treasurer and general manager; Dorothy Day, secretary and assistant treasurer.

•

GEORGE MATTISON, president of the Woodstock Slag Co., Birmingham, Ala., has been appointed a member of the Unemployment Compensation Commission by Governor Dixon of Alabama.

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CHARLES F. MILLER, manager of the American Gypsum Co., was recently elected president of the Port Clinton, Ohio, Chamber of Commerce. Fred Kreutzfeld of the United States Gypsum Co., was elected secretary and treasurer.

•

HENRY LEE MASON, JR., Pittsburgh, has been elected a director of Alpha Portland Cement Co., to succeed J. M. Lockhart, deceased.

Plant Personality

WE WONDER if the day isn't coming when industrial managements will pay more attention to the aesthetic side of plant layout. We have seen more and more attention paid to safety and to good plant-housekeeping, with advancing ideas of labor relations and public relations. Why not a step farther and make industrial establishments attractive? Most of us spend the greatest part of our lives in our places of business. Can't these be made enjoyable as well as necessary places of detention?

What gives rise to these lofty thoughts is recollection of a visit to the offices and laboratory of the Western Precipitation Co., one last day last September. These offices are in the heart of the city of Los Angeles, yet from the office windows one can look out upon a scene

Walter A. Schmidt

Office and laboratory building of Western Precipitation Co., Los Angeles, Calif., in a tropical setting

as tranquil as if miles removed from the city's riotous motor traffic. Here is shade, places to sit, pools of water with goldfish and frogs.

This little patio, not half as big as the usual city backyard, is the handiwork of Walter A. Schmidt, president of the Western Precipitation Co.; and we understand he did much of the landscaping with his own hands. From his office, when distraught with business cares, he can look upon or go forth and sit in the shade of a sub-tropical jungle and think of pure research without distraction!

Maybe a lot more of us would be better off if we could take a little time out, now and then, and communicate with nature under our office windows.

A few of the West Coast cement company executives seem to have imbibed some of the same inspiration, for their plant offices are in attractive surroundings, as witness those of the Olympic Portland Cement Co., Bellingham, Wash., and the Southwestern Portland Cement Co., Victorville, Calif., as illustrated in our January issue.

Obituaries

GEORGE F. BAYLE, SR., formerly president of the Glens Falls Portland Cement Co., passed away March 10 at the age of 78. Born at Bald Mountain, N. Y., Mr. Bayle started his career at the age of 12 and rose steadily, achieving prominence in business, public affairs and civic movements. After making an enviable record in the mercantile world he retired from active business in 1902 but later, in 1905, became president of the Glens Falls Portland Cement Co. He also was active in the Portland Cement Association for many years, serving as a director and on a number of prominent committees.

•

R. J. MORSE, vice-president and general manager of the Ideal Cement Co., Denver, Colo., died February 26 from

R. J. Morse

complications following an operation. For thirty-five years he was associated with Charles Boettcher in the development of the Ideal Cement Co., and was known as the operating genius of the group of western plants under Boettcher management. He became superintendent of the Colorado Portland Cement Co., Portland, Colo., plant a few years after he joined the company and was later made vice-president and general manager of the Ideal Cement Co., the parent concern. He also served on the Committee on Accident Prevention and Insurance of the Portland Cement Association. Donald A. Morse, one of his sons, is assistant superintendent of the Colorado Portland Cement Co.'s Portland, Colo., plant.

GEORGE NELSON VAN TINE, 78, pioneer sandstone quarryman of Washington state, died February 25. He went to the state in 1887 and opened the sandstone quarry at Tenino.

•

WILLIAM LEONARD CATEN, 45, vice-president in charge of sales of the W. H. Loomis Talc Corp., Gouveneor, N. Y., since 1926, died March 3.

•

ANDREW JACKSON KING, Portsmouth, Ohio, died February 25 at the age of 84. He had been associated in the sand and gravel business since 1892 with his son, Charles I. King, who is vice-president and general superintendent of the Portsmouth Sand and Gravel Co.

•

DANIEL J. DONOVAN, who was engaged in the crushed stone business in the Kingston, N. Y., area before his retirement, died March 8.

•

GEORGE N. TITUS, building supply dealer of Waynesboro, Va., died March 2 shortly after his return from the Concrete Industries Exposition, in which he took an active part. This was the first convention Mr. Titus attended and he had purchased equipment while there to enable him to begin manufacturing concrete block. It is regretted that as a result of his death the enterprise will not be undertaken.

•

EDWARD M. GRAY died February 16 at the age of 72. For twenty years he had been an active figure in the aggregate business in Iowa, having served several terms as president of the Iowa Aggregate Producers Association. At the time of his death he was president of the Des Moines Sand & Fuel Co., and the Central Iowa Sand & Gravel Co.

Edward M. Gray

NATIONAL ASSOCIATION ACTIVITIES

Industrial Sand

SECRETARY V. P. AHEARN of the National Industrial Sand Association has announced that among a number of interesting papers and subjects for discussion at the coming convention on May 24, 25 and 26 at the Ambassador Hotel, Atlantic City, N. J., there will be a very thorough discussion of the question of occupational disease legislation.

Sand and Gravel

STANTON WALKER, director of engineering, National Sand and Gravel Association, recently announced the addition of M. Cedric Gleason to the research staff at the University of Maryland, College Park, Maryland. Seven subjects were outlined on which studies were being made: study of marl as an admixture in concrete; tests on fineness of mineral filler; study of sand from an undeveloped deposit in comparison with an about-to-be-depleted deposit operated for many years; comparison of sand from a member company's established plant with a material locally produced by WPA labor; comparison of the soundness, as measured by 20 cycles of the sodium sulfate test, and mineral composition of different sizes of a river gravel ranging from No. 4 to 3½ in.; study of mineral composition, soundness, and resistance to abrasion of gravel produced by a member company; a special study in behalf of a member of the National Ready Mixed Concrete Association, dealing with the determination of ranges in moisture content and grading of sand and gravel.

Lime

NATIONAL LIME ASSOCIATION has announced that the Homestead Hotel, Hot Springs, Va., has been selected for the annual convention which will be held on June 1 and 2. The association reports in a recent bulletin on national legislation that sentiment continues to be built up for anti-basing point legislation. The present most-favored plan is to amend the Robinson-Patman Price Discrimination Act to define net price as the price charged the purchaser, less actual transportation costs, and to forbid discrimination between customers as to net price. Reporting on the liming material purchase program of the AAA, the association advises that as a result of lime manufacturers' opposition to the method of buying by competitive bid, invitations to bid for Maryland, Delaware and Pennsylvania were postponed. Invitations to bid on materials for application to pasture in Pennsylvania are being sent out, the invitations specifically requesting that bids be made through dealers. Delivery will be asked for the period May 1 to September 1. A copy of the latest mortar specifications has been mailed out. The principal change from the former specification lies in the provision that putty prepared from quicklime should weigh at least 80 lb. per cu. ft.

Safety Congress

NATIONAL SAFETY COUNCIL, Chicago, Ill., has announced that the 1939 National Safety Congress and Exposition will be held in Atlantic City, N. J., October 16 to 20. This year there will be 130 sessions and 600 speakers at the Congress.

American Society for Testing Materials

SEVERAL COMMITTEE REPORTS of outstanding interest to aggregates producers were presented at the recent meeting of A. S. T. M. in Columbus, Ohio, March 6 to 10. A more complete report of the Symposium on Lime conducted by Committee C-7 appears on another page in this issue.

The subcommittee on methods and apparatus for testing concrete of Committee C-9 on Concrete and Concrete Aggregates is recommending revisions in the methods of making compression tests (C 39), flexural strength (C 78), making and sorting compression specimens in the field (C 31), securing specimens of concrete from structures (C 42), and compression tests with portions of beams (C 116). Tests for consistency of portland cement concrete (slump test) (D138) and for yield of concrete (C 138) were recommended for adoption as standard. The subcommittee on nomenclature approved for adoption as standard the existing tentative definitions for "fineness modulus," "admixture," "crushed stone," and "gravel" which were published under ASTM designation C 125-36 T. A joint committee on definitions has been formed with the American Concrete Institute.

The subcommittee on specifications and methods of test of aggregates has prepared revisions in the tentative specifications for concrete aggregates (C 33) and the specifications as revised will be recommended for adoption as standard. The method of tests for unit weight of aggregate (C 29) will also be revised this year and adopted as standard to supersede (C 29-27). Committee C-9 joined with Committee D-4 in recommending revision and adoption as standard of the tentative method of test for abrasion of coarse aggregate by the use of the Los Angeles machine (C 131). A letter ballot will be taken on the question of adopting as standard the six existing tentative standards which cover specifications for lightweight aggregate (C 130), and methods of tests for clay lumps (C 142), coal and lignite in sand (C 123), sieve analysis of fine and coarse aggregates (C 136), specific gravity and absorption of coarse aggregate (C 127) and fine aggregate (C 128).

Committee C-1 on Cement will submit by letter ballot its recommendation that the final setting time requirement be eliminated from the present A. S. T. M. Standard Specifications for high-early-strength portland cement (C 74). Approval also was given to two alternate methods for the determination of free calcium oxide in portland cement and clinker for inclusion in the tentative methods of chemical analysis of portland cement (C 114). A new method for determining the specific gravity of cement was accepted.

Committee D-4 on Road and Paving Materials has developed a new procedure for sieve analysis of mineral fillers which will be published as information. Consideration is being given to definitions of flat and elongated particles of aggregates and a method for detecting soft particles in aggregates is also being drafted. It was also decided to recommend certain revisions in three specifications covering various types of emulsified asphalts with the thought that these specifications (emulsified asphalt for coarse aggregate plant mixes) (D 397), for retread and coarse aggregates mixes (D 398), and for heavy premix-summer grade (D 399) would be adopted as standard or combined into a single standard.

CONCRETE PRODUCTS AND CEMENT PRODUCTS

Church Interior of Concrete Blocks

Concrete Products Manufacturing Co., Brentwood, Mo., furnished 30,000 blocks for church auditorium at Ferguson, Mo.

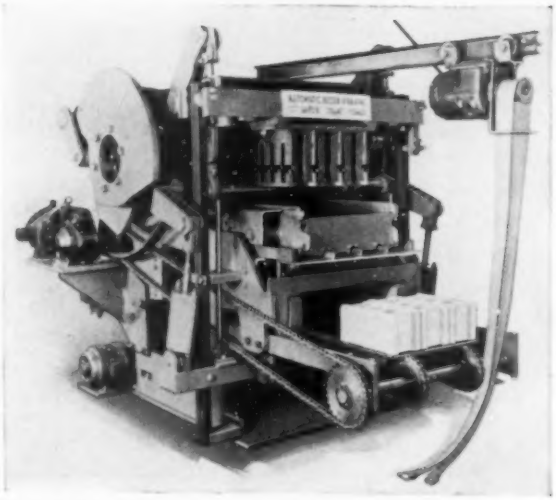
TAMPERS

BESSER

VIBRATORS

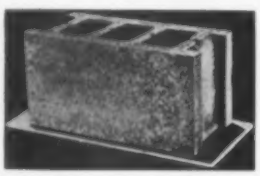
Plain Pallet Strippers

Besser Super Automatic
Unitized Plain Pallet Stripper



BESSER AUTOMATIC VIBRAPAC
PLAIN PALLET STRIPPER

FULLY PRESSED TOP



"I cannot sell any other concrete block since I got the Besser with FULLY PRESSED TOP units made on Plain Pallets." — Wayne Martin, Lansing, Michigan.

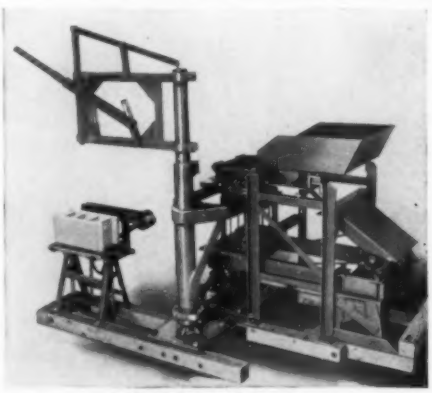
For Better Concrete Masonry

BESSER

PLAIN PALLET STRIPPERS

All Sizes and Types of Units Made on One Set of Plain Pallets

Besser Super Automatic Plain Pallet Stripper—Daily Capacity 3000 to 4000
Besser Victory Automatic Plain Pallet Stripper—Daily Capacity 2000 to 2500
Besser Semi-Automatic Plain Pallet Stripper—Daily Capacity 1200 to 1500
Besser Champion Power Operated Plain Pallet Stripper—Daily Capacity 1000 to 1200
Besser Multi-Mold Hand Operated Plain Pallet Stripper—Daily Capacity 250 to 350
Besser Automatic Vibrapac Plain Pallet Stripper—Daily Capacity 4000 to 5000
Besser Power Operated Vibrapac Plain Pallet Stripper—Daily Capacity 2000 to 2500
Besser-Flam Plain Pallet Vibrator—Daily Capacity 800



BESSER-FLAM VIBRATOR
West of Rockies address inquiries about this machine to Stephen Flam, Sherman Oaks, Calif.

BESSER MANUFACTURING CO.

COMPLETE EQUIPMENT FOR CONCRETE PRODUCTS PLANTS

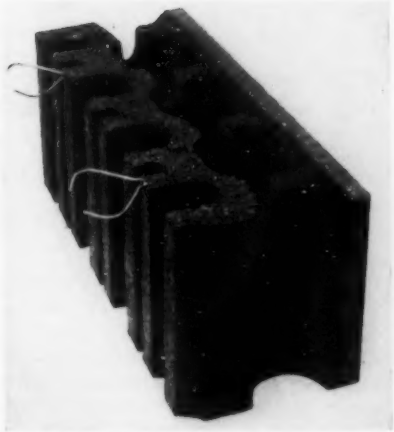
Complete Sales and Service on BESSER, ANCHOR, CONSOLIDATED, IDEAL, HOBBS, UNIVERSAL

204 39TH STREET **ALPENA, MICHIGAN**

THE SAVING IN PALLET COST WILL PAY FOR A BESSER PLAIN PALLET STRIPPER

Moisture-Proof Block

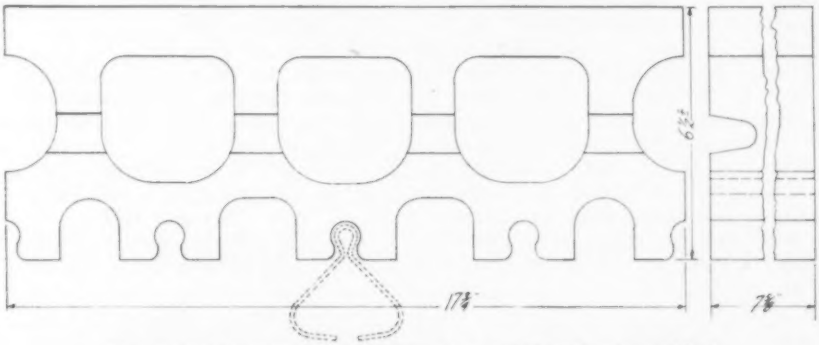
Asphalt-Dipped Unit Has Been Designed to Keep Out Water



Asphalt-dipped block showing depression running longitudinally along the top which prevents any penetration of water

"Tytite" is the name of a new partition cinder block developed by Media Concrete Products Co., Inc., Media, Penn. This unit was designed to compensate for the deficiencies of various veneer surfaces in their resistance to the penetration of water and moisture. Application has been made for a patent on the new unit.

Manufactured on automatic machinery in the more common sizes sold in the Philadelphia area, the design of the block and its treatment with emulsified asphalt gives it a combination of features very unfavorable to the infiltration of water.



Plan and end sections of moisture-proof, asphalt-dipped concrete block

These units are used primarily as backup to brick, stone, cast stone and other exterior wall materials, and its design is such that the partition wall and outside wall are bonded together with Tytite metal reinforcing regardless of dimensions of the exterior units and the height between courses.

The accompanying illustration of a standard dimension, asphalt-dipped unit shows the details. Vertical cores on the side of the blocks, adjoining the veneer, are continuous with those of the courses below and above, so that the reinforcing ties are easily adjusted to any height. The ties extend about 2½ in. into the outside mortar joint.

It will be noted that the top surface is not continuous from front to back, therefore in laying up the block the mortar joint is split to interrupt the penetration of water from the outside toward the inner wall surface. Should water penetrate through a mortar joint it has the tendency to drop through the open core, as evidenced by test.

A panel wall of "Tytite" units 8 ft. high and 4 ft. wide, was subjected to 70 lb. of city water pressure continuously for three days to determine performance under extreme conditions. The wall revealed no penetration on the far side but there was evidence that some water had dripped through the vertical cores. Furring or plaster can be applied directly to the exposed wall. Plaster lath could also be applied directly to the rough side of the block if they are to be laid up for an exposed wall.

A commercial automatic block machine has been rebuilt to manufacture seven 8- x 8- x 18-in. units per minute. Widths of 4½-, 6½ and 7¾-in. are the sizes which have been made so far. The standard unit, of cinder concrete, weighs 31 lb. but also could be manufactured with other aggregates. After casting, they are steam-cured.

Units are waterproofed by immersion in a tank containing emulsified asphalt at a temperature of 120 deg. F. The penetration of the asphalt is about ⅛ in. on all surfaces except the side to be exposed, which is untreated. About one-half day is needed to dry the blocks after asphalt is applied. The cost of the dipping operation, for asphalt and labor, is 3c to 7c per block, according to the quantity, type and method used.

"Tytite" units, while a very new development, already have been used in the construction of a large Y. M. C. A. building at Carney's Point, Penn., and are specified in 4-, 8- and 12-in. widths for a number of public buildings.

Samuel Williamson, president of the company, developed the "Tytite" block. The company is one of the larger concerns operating in the Philadelphia area and was incorporated in 1926.

Large stock of concrete blocks and bricks of various sizes make it possible to supply practically any demand

Sell More Ready-Mixed

Special Handling Equipment and Planning the Job Increases Profits

By H. F. THOMSON*

Fig. 1: Silos being built with "slip forms." Truck delivers concrete to buggies which are hoisted and wheeled to the point for pouring hopper bottoms. A different quality of concrete is elevated by skip and delivered by chute to forms for the silo walls

Ready-mixed concrete producers can help their own service, as well as assist contractor-customers, by contacting the job in advance of deliveries and working out a suitable plan for the rate of delivery and also the method of rehandling the concrete to final placement. Many jobs, particularly small foundations, are spoiled for service by ready-mixed concrete through the failure of the general contractor, the excavator, and the concrete contractor or the concrete foreman to coördinate their several activities, with the result that the excavator spreads the earth all around the excavation without leaving any convenient access by trucks; then when the concrete man is called in, he finds that the trucks can't get near the foundation.

The matter of policy as regards furnishing accessory equipment for handling concrete between the trucks and forms is an important question for every ready-mixed producer to consider. Special handling equipment may offer possibilities in reducing the waiting time of trucks or in improving the contractor's efficiency, but at the same time such equipment may involve "dynamite" if the producer puts himself in the position of rendering too much equipment service to the contractor. A conservative view would be that in offering ready-mixed concrete, a producer is furnishing a building material, and that so far as possible, he is best off by limiting his operation to the delivery of that building material at the chute of his truck. Of course, there may be instances where it is necessary and desirable for the producer to introduce some intermediate handling equipment, but unless a definite policy in connection with the furnishing and servicing of that equipment is worked out in advance, a great deal of complication may result.

Illustrations show some of the common methods of handling ready-mixed concrete between the delivering trucks and the forms. The methods shown may be classified as:

(a) Direct chuting
(b) Buggies
(c) Skip and tower
(d) Bucket and crane
(e) Conveyors
(f) Concrete pump

* Mr. Thomson is vice-president, General Material Co., St. Louis, Mo., and former president of the National Ready-Mixed Concrete Association. The article is an abstract of his interesting talk before the recent convention of the association at Cincinnati, Ohio.

Fig. 2: For covering large floor area, the contractor used a long chute which was served by a skip and tower. Fig. 2-A (insert): Skip discharging concrete into floor-hopper from which buggies are filled

These views are not intended to show extraordinary situations or to indicate any particular tricky operations, but simply more or less routine deliveries.

The simplest delivery of ready-mixed concrete is that of dumping or chuting the concrete directly from the truck into the form. This is the ideal delivery whenever the form is near or below grade and the truck can drive alongside, as it utilizes the mobility of the

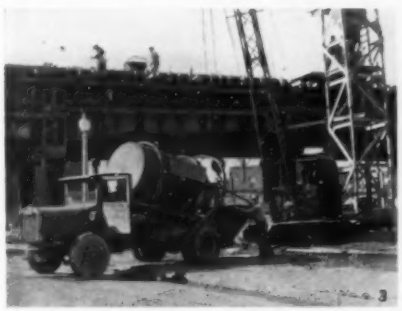


Fig. 3: Truck delivering concrete into a bucket which was raised by crane and then dumped into a hopper. Buggies were filled from the hopper and wheeled to the point of placing

truck and minimizes the labor of placing the concrete. The facility of spreading the concrete by the truck's swinging chute can be used to advantage on a paving, sidewalk, or ground-floor job.

Direct delivery by chuting into place, on a railroad grade-separation job is another efficient method. In this instance the contractor originally planned to handle the ready-mixed concrete over a tower, but adopted the scheme of having the concrete trucks drive onto the railroad trestle and deliver the concrete direct, thereby speeding up the job and saving the expense of erecting and operating the hoist.

Buggies (or wheelbarrows) are commonly used for handling concrete from trucks to forms which are near or below grade, when the area covered is too great to be reached by the truck's short chute. An important point for the concrete operator is to arrange with the contractor for sufficient buggies and wheelers to move the concrete promptly and avoid undue delay of the truck.

More than one method of handling the concrete on a single job may be found of advantage. In the accompanying view of a group of silos being built with "slip forms," Fig. 1, the truck was delivering to buggies which were hoisted and wheeled to the point for pouring the hopper bottoms; and behind the truck was the tower over which a different quality of concrete was elevated by skip and delivered by chute into the forms of the silo walls.

In handling concrete by skip and tower, it is desirable that a hopper having a capacity of 1½ to 2 truckloads, be provided, into which the trucks can dump and be released, and from which the skip is filled as concrete is needed. In the view shown, Fig. 2A insert, (the first floor of a six story structure) the skip discharged into a floor-hopper, from which buggies were filled. In this arrangement the delivery-hopper and the floor-hopper serve as "fly wheels" to take up any irregularities in rates of delivery or placing the concrete.

For covering a large floor area, the contractor on the job shown, Fig. 2, used a long chute, which was served by a skip and tower. Concrete which was carefully designed and controlled, was handled over this long chute without segregation.

Handling the concrete by crane and buckets is frequently an economical method, especially if the pour covers an area which can be reached by the crane boom or if the concrete is to be elevated a moderate height. It is advantageous to the ready-mix delivery to use two buckets, one to be filled while the other is handled by the crane.

Fig. 3 shows a combination of handling methods on a highway grade-separation project. The truck delivered the concrete into a bucket, which was raised by crane and then dumped into a hopper; buggies were filled from the hopper and wheeled to the point of placing.

Handling concrete by belt conveyors is illustrated in Fig. 4. The project was the deck of a subway where the intersecting street crossings had been built previously. The concrete moved from the truck over a number of individually-powered belt conveyors in series, and was finally distributed by a pivoted chute at the end of the last conveyor. The view shows two lines of four conveyors each in operation.

Unique methods of handling may be necessary on unusual projects. Fig. 5 shows work in placing the roof of a large reservoir. The delivery truck dumped into a receiving hopper (not shown in the view) from which a small hopper carried by a light truck was filled; the hopper-truck discharged into a belt conveyor carried on a frame spanning the panel between supporting columns; concrete was discharged from the belt by a movable "grain unloader", and was distributed onto the forms by an "elephant trunk." This unusual layout was speedy and economical.

For handling concrete on mass pours, with horizontal movement up to about 1000 ft. or vertical movement up to

Fig. 6: Concrete truck discharging into a hopper above a concrete pump

about 100 ft., a special type of pump is available. In this view of a bridge job, Fig. 6, the concrete truck discharged into a hopper above the pump, and the pump forced the concrete through a pipe line into a hopper from which buggies were filled. Such an operation is especially adapted to mass pours on dams, bridges, buildings with heavy floors, and similar structures.

Fig. 4: Concrete moved from trucks over a number of individually-powered belt conveyors in series. Fig. 5: Ready-mixed concrete truck delivers to hopper on light truck which discharges into a belt conveyor carried on a frame

RECORD-BREAKING YEAR AGAIN PROVES....

Home buyers want CONCRETE

Will they get concrete? *Who* will be the Builder? AGAIN IT'S *UP TO YOU*

IN 1938 concrete home construction once more broke all records—with *3 times* as big a share of the residence market as in 1935.

In 1939 Portland Cement Association national advertising will again go into the best homes in your community and direct house prospects to *YOU*.

Can they find you?

Yes, if you build demonstration homes.

Yes, if you advertise in phone books, newspapers, by mail or radio.

Yes, if you display truck and job signs.

Yes, if you have live-wire salesmen to follow up leads.

Concrete contractors, concrete masonry manufacturers, builders and realtors who feature concrete houses will enjoy a steady, growing volume of business.

PORTLAND CEMENT ASSOCIATION

Dept. A4-45, 33 W. Grand Ave., Chicago, Ill.

A National Organization to Improve and Extend the Uses of Concrete

MULTIPLEX

DOUBLE STRIPPER

Double Stripper. Lever press. 500-1000 blocks per day.

6 FEATURE ADVANTAGES

- Low initial cost and low cost operation.
- Makes quality products.
- Produces blocks from a wet mix.
- Makes a waterproof block.
- Masons prefer blocks made on Multiplex machines as every side is finished and true to size.
- Adjustable for all sizes of random ashlar work, as well as other sizes and style units.

The Multiplex Double Stripper requires no motive power. Will produce 500 to 1,000 quality units per day. Thousands of plants have built up a good reputation and sound business with these strippers. Ask for details of the complete Multiplex line. The name MULTIPLEX safeguards your reputation and profits.

Multiplex Concrete Mach. Co. ELMORE OHIO

COMMERCIAL'S *New Catalog*

"JUST OFF THE PRESS"

WRITE FOR IT

The COMMERCIAL SHEARING & STAMPING COMPANY
YOUNGSTOWN, OHIO.

Develop New Uses for the Concrete Silo Stave

By BROR NORDBERG

Precast concrete silo staves have been adapted by the Marietta Concrete Corp., Marietta, Ohio, to a new use in the construction of farm buildings. By the use of these inexpensive masonry units the farmer can have the benefit of higher type construction at favorable cost. Although it is a comparatively recent development, several barns and other buildings have already been built with the new type construction.

In the illustration is shown how attractive and practical concrete buildings can be on the farm, this particular structure having been recently constructed of silo staves shipped from the company's Baltimore, Md., plant.

In manufacturing the staves, there has been little change in design from the standard 2½- x 10- 30-in., stave used in erecting silos and bulk storage bins. The conventional silo stave has grooved and tongue edges to give a book effect in laying up in a circular plane. When used for vertical, straight walls, the design of the stave has been modified to provide a close fit. Both units are manufactured on the same Besser silo stave machine.

Construction comprises two walls separated to provide a 3½-in. air space for insulation, the walls being maintained in place by 10-ft tension rods placed in the mortar joints. In addition to insulation against heat and cold, this type of farm building offers the other advantages of concrete construction—permanence, durability, resistance to fire and invasion of termites—and it is available to the farmer at costs comparable to frame construction. By selling the farmer on the benefits of storing hay in concrete silos, a one-story barn will serve his other purposes. The illustration shows a 36- x 70-ft. barn, with a reinforced concrete joist roof and silo stave walls, which is painted with white portland cement paint.

Make Insulation Refractories for Industries

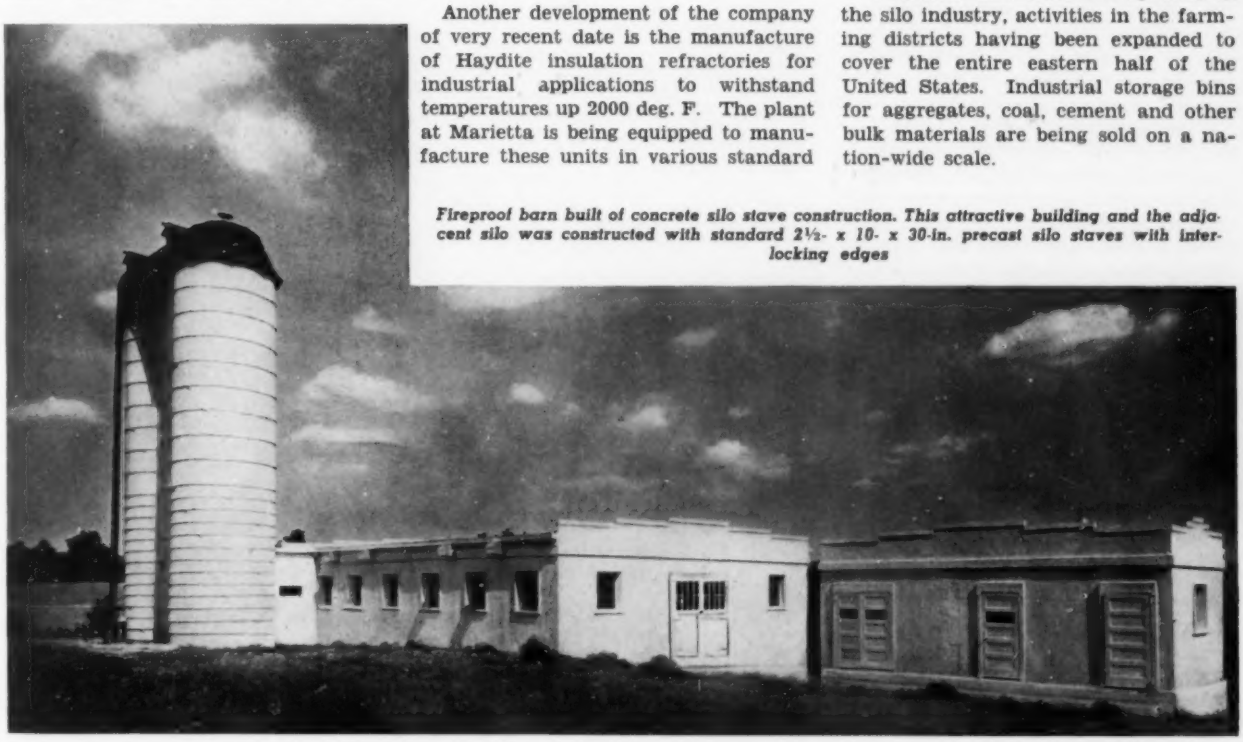
Another development of the company of very recent date is the manufacture of Haydite insulation refractories for industrial applications to withstand temperatures up 2000 deg. F. The plant at Marietta is being equipped to manufacture these units in various standard shapes and is producing special shapes on order.

"Haydite insulation refractories" are made from Haydite lightweight aggregate, vermiculite and lumnite or standard portland cement, the proportions being varied according to the application for which the units are to be used.

Vermiculite (expanded mica) is substituted for part of the Haydite aggregate to increase thermal insulation and to lower the unit weight at the sacrifice of only a small part of the unit strength. A number of variations in the selection of the materials and their proportioning have been made by Marietta to fit various temperature conditions up to 2000 deg. F. or lower temperatures, not to exceed 1200 deg. F.; standard portland cement is used in place of lumnite cement to reduce first cost. At present, the materials for brick sizes are mixed in a concrete mixer and the units are being manufactured on an Anchor machine and cured in the conventional curing kilns.

Marietta Concrete Corp., in addition to these recent developments, manufactures a complete line of concrete products, produces sand and gravel, and is certainly one of the more progressive manufacturers in the industry. Among the more important concrete products manufactured are standard and special building units of Haydite or sand and gravel aggregates, concrete vaults, precast concrete joists, trimstone and concrete silo staves.

"Marietta" has become a by-word in the silo industry, activities in the farming districts having been expanded to cover the entire eastern half of the United States. Industrial storage bins for aggregates, coal, cement and other bulk materials are being sold on a nation-wide scale.



Fireproof barn built of concrete silo stave construction. This attractive building and the adjacent silo was constructed with standard 2½- x 10- x 30-in. precast silo staves with interlocking edges

One of the sessions of the American Concrete Pipe Association convention in San Francisco.

Drainage and Irrigation Topics at "Frisco" Pipe Convention

Concrete pipe manufacturers went west, to San Francisco, Calif., to attend the 32nd annual convention of the American Concrete Pipe Association, February 23-25, and to see the Golden Gate International Exposition. Representation at the meetings compared very favorably with those previously held in less remote localities, and the program was studded with interesting papers and reports.

H. W. Chutter, manager, Jourdan Concrete Pipe Co., Fresno, Calif., was reëlected president. New vice-presidents elected were J. W. Porter, secretary, Gifford-Hill Pipe Co., Dallas, Texas, and J. L. Miller, president of the Lewistown Pipe Co., Fort Wayne, Ind., to serve with W. B. Freeman, branch manager, Lock Joint Pipe Co., Denver, Colo.

Drainage problems, developments in sewage disposal and design and some of the outstanding water projects were discussed principally by the featured speakers. R. M. Gillis, construction engineer, Division of Highways, Department of Public Works, Sacramento, Calif., in his talk, "Drainage Problems in California," spoke generally on the need for adequate drainage of highways.

Charles Gilman Hyde, professor of sanitary engineering, University of California, Berkeley, Calif., reviewed the development of the sewage problem and stressed the need for improvements in methods in a talk, "Developments in Sewage and Sewage Disposal."

"Sewer Design, Operation and Maintenance" was the subject of a talk by A. M. Rawn, assistant chief engineer, Los Angeles County Sanitation Districts, Los Angeles, Calif., in which he discussed problems in detail for the country as a whole. Edward Hyatt, State engineer, Sacramento, Calif., pointed to the need for irrigation in a paper, "The Central Valleys Water Project."

Other highlights of the convention were a sound moving picture on the construction of the San Francisco Bay Bridge presented by courtesy of the Columbia Steel Co., San Francisco, and open forum meetings on irrigation, drainage and common industry problems.

At one of the business sessions, it was voted that committee C13 be authorized to advance A.S.T.M. tentative specification C-11838-T on irrigation pipe to standard. A new promotional bulletin, "Concrete Pipe for Irrigation and Drainage," is to be published by the Association. The bulletin is to be concerned mainly with practices in California, Oregon, Washington, Utah, Montana and Texas where these subjects are of particular interest. The convention closed with the annual dinner, attended by 130, and the inspection of the Golden Gate International Exposition. Chicago was selected to be host to the 33d annual convention in 1940.

Speakers at the American Concrete Pipe Association Convention. Left to right: R. M. Gillis, construction engineer, Division of Highways, State of California; Dr. Chas. Gilman Hyde, professor of sanitary engineering, University of California; H. W. Chutter, president of the association; A. M. Rawn, assistant chief engineer, Los Angeles County Sanitation Districts, Los Angeles, Calif.

Concrete Blocks As X-Ray Protective Material

A NEW MARKET for concrete blocks has been suggested by a recent study of the National Bureau of Standards on "Concrete as a Protective Material Against High-Voltage X-Rays" (research paper RP1115). There has been an extension in the application of x-rays to the inspection of metals, and in the use of x-radiation as a scientific tool in the physical laboratory. With this trend, the need for adequate protection of personnel against very penetrating radiation has become more urgent than ever. Lead, the most favorable protective material, has been used, but its cost for the larger barriers that are required becomes very high and the problem of supporting the required lead mass becomes serious. Concrete seemed to be the natural substitute and the tests made on specially prepared test specimens and three different kinds of building blocks purchased in the open market showed that for the building blocks a barrier of about 11.8-in. is adequate at 400 kv. and for concrete a barrier of about 10.4-in. is adequate at 400 kv. Commercially available equipment has a voltage interval of up to 400 kv.; therefore fitting the test.

Placing a Glaze Finish on Colored Concrete Units

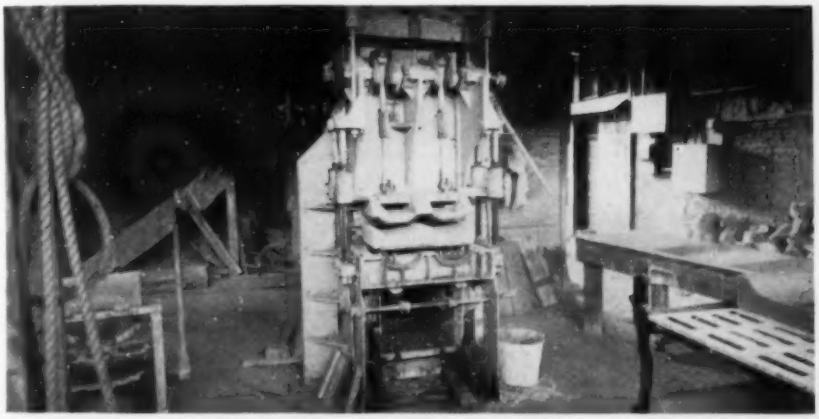
Use Electric Vibrating Table and Special Press

About 45,000 people recently attended the opening of a modern home in Pittsburgh, Penn., in which structural glaze-faced concrete units were used for exterior and interior treatment. The unit, developed by the Glaze-Crete Corp. of Pittsburgh, has had application in other types of buildings in Pittsburgh but the "New American" home, built in Cedarhust Manor, Mt. Lebanon, was its first official showing as applied to modern home construction.

The unit was developed to provide a non-porous, washable finish for structural units which would broaden the general usage of concrete structural units for both external and internal construction and to devise unusual and unlimited artistic possibilities for the architect. To illustrate the versatility of the product, which is available in a wide range of sizes and in an unlimited selection of colors, they are recommended for use in the construction of gasoline stations, airports, restaurants, bathrooms, kitchens, etc., wherever colors are desirable.

Special Machinery Required To Make Glazed Units

Glaze-Crete units are manufactured by specially-developed machinery consisting of a vibrating table for placing the colored surfacing and a semi-automatic press machine for molding the concrete backup.



Above: Equipment for the manufacture of "Glaze-Crete" comprises a power press machine, in the center, for the backing and a vibrating table to the right on which glossy surfaces are cast. Below: A few standard samples of structural block cast with glassy, decorative faces. Note the cored-out section on one side of the unit

Units are manufactured in 2- and 4-in. thicknesses and in sizes ranging from 2¾- x 11¾-in. to 11¾- x 23¾-in. with all intermediate lengths up to 23¾-in. The surfacing is of clean stone sand aggregate mixed with white portland cement and the coloring is of mineral oxide or a commercial mixture, "Coloroc."

Pallets are of 22-gauge stamped stainless steel plates with rounded edges designed to produce a straight, clean mortar joint. Surfacing material to a thickness of about 3/16-in. is vibrated into place on the vibrating table in about 30 seconds. After this operation, the pallet is placed in the production machine and the backing of sand and gravel concrete is applied immediately. The machine has a capacity of two units per minute, all of them having hollowed out back surfaces to take the place of cores in conventional concrete block. Pallets are re-used after they have been polished with wire wool and a wax similar to ordinary floor wax. Units are handled from the machine on industrial racks and track into the steam curing kilns where they are steamed over night in the same way that other units are handled.

When subjected to five cycles of the sodium sulfate soundness tests, "glaze-crete" units have shown no evidence of checking or spalling, according to the Pittsburgh Testing Laboratory. Compressive strengths are about 1800 to 2200 p.s.i.

August De Giovanni, president of Glaze-Crete Corp., developed the unit and designed the equipment for its manufacture.

H. E. Bailey, who has been manager of the Concrete Pipe Association of Oklahoma, Oklahoma City, Okla., has been appointed a member of the new three-man highway commission by Governor Phillips of Oklahoma. Mr. Bailey is well-known to concrete pipe and products men in the southwest. He was manager of the Enid Concrete Pipe and Stone Co., Enid, Okla., from September, 1932, to August 15, 1933. Following this connection, Mr. Bailey worked for the Oklahoma highway department as a resident engineer at Lamont, and as division engineer at Perry, Okla. His education was obtained at Kansas A. and M. College, Manhattan, Kansas, and at the University of Tennessee where he studied engineering.

Universal Concrete Pipe Co. will move its New Martinsville, W. Va., plant to Wheeling, W. Va., according to a statement by George Malfregeot, manager. All employes will be taken care of after the change.

Concrete Products Exhibited at Home Show

PRODUCERS of concrete masonry occupied two booths at the Home Show in the Milwaukee Auditorium, March 11 to 18. Firms represented included the Berthelet Fuel & Supply Co., Best Block Co., Better Block Co., Inc., Cities Fuel & Supply Co., Wm. H. Devos Co., Inc., M. Engersbach Co., Inc., Erdmann & Goetzinger Co., Otto Frey & Sons, Joe Klopfer, Otto Ladwig & Sons, Inc., Maramonte Cement Block Co., Milwaukee Block Co., Reliable Block Co., W. L. Schwan & Son and Vogel Bros. The show attracted approximately 100,000 persons during its eight days.

Products Manufacturer Represents Pottsco

HERMAN FRAUENFELDER, closely associated with the concrete products industry during more than thirty years, has been appointed district manager for the Pottsco department of The Celotex Corporation, Chicago, Ill., by Henry W. Collins, vice president in charge of merchandising.

With headquarters in Cleveland, Ohio, he will handle the development and sale of Pottsco light-weight concrete aggregate in the territories of western Pennsylvania, eastern Ohio, West Virginia.

A past president of the Cast Stone Institute, and recently sales manager of Marcrome Art Marble & Cast Stone Co., St. Louis, Mr. Frauenfelder is well known and widely acquainted in the concrete products industry.

Add to Ready-Mixed Facilities

KIRKPATRICK SAND & CEMENT CO., Birmingham, Ala., has reconstructed its ready-mixed concrete plant to increase capacity. Two standard bulk aggregate bins were elevated an additional 10 ft. by extending the legs and building a special substructure. Two single weighing Blaw-Knox batchers were then purchased and applied to the bins.

Reconstructed ready mixed concrete plant of Kirkpatrick Sand & Cement Co., Birmingham.

Material is received in hopper bottom cars and an efficient unloading method was provided with the installation of an inclined elevator to deliver aggregates to the bins. Cement is introduced into the truck mixers from the warehouse in a separate operation. Three 1½-cu. yd. Blaw-Knox truck mixers are used.

Concrete Blocks for Church Interior

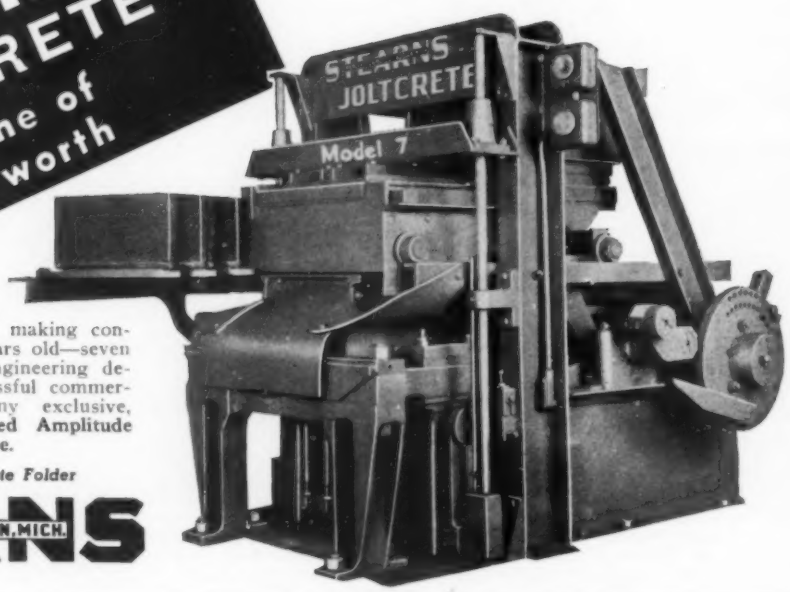
CONCRETE PRODUCTS MANUFACTURING CO., Brentwood, Mo., a suburb of St. Louis, recently furnished 20,000 concrete units for the construction of the interior of St. John and St. James Church at Ferguson, Mo. Equipment includes a Besser Super Stripper fully automatic block machine with a capacity of six 8-x 8-16 in. block per minute, and a Besser 50 cu. ft. mixer. Officers of the company are: R. J. McManemin, president; F. J. Grutsch, vice-president and treasurer; and A. H. McManemin, secretary.

CENTRAL PRE-MIX CONCRETE CO., Spokane, Wash., has started construction of a one-story building with attached machine shop and garage, the cost to exceed $5,000. It will be built of concrete and concrete blocks and will have the appearance of a modern home.

Buy STEARNS JOLTCRETE — a machine of proven worth

Here's No. 7

Operates exactly like the original Stearns Joltcrete No. 9 — makes two 8x8x16" blocks per cycle, 3½ cycles per minute. It's hard to compete against Stearns Joltcrete blocks!



The Stearns Joltcrete method of making concrete units is not new. It's nine years old—seven years of careful experiment and engineering development and two years of successful commercial operation. It embodies many exclusive, patented features—including **Limited Amplitude Vibration—Vibration Under Pressure.**

Write for the New Stearns Joltcrete Folder

STEARNS MANUFACTURING CO. - ADRIAN, MICH.

GENE OLSEN, PRESIDENT

Mass Production Methods of Pipe Manufacture

Twelve Concrete Pipe Plants Now Operating

Continuing its rapid expansion, Universal Concrete Pipe Co., Columbus, Ohio, has built and put into operation a new, modern concrete pipe plant at Youngstown, Ohio, making a total of twelve plants, including one more recently placed under construction at Somerset, Penn. Four of these plants, in the east, were built in the past two years and a fifth, the Yancey Concrete Pipe Co., Atlanta, Ga., was purchased in 1938.

To the left, G. E. Bing, general manager of new plant, and H. Crimmel, plant foreman

On September 1, 1938, the Youngstown plant began operations. The building, of galvanized steel and concrete construction, is located adjacent to the New York Central railroad and occupies an area of 60- x 114-ft. which includes three steam curing kilns.

Curing Methods

Pipe, from 8- to 48-in. diameters, are manufactured on a Universal tamping machine, a machine manufactured by the company which is used in all of its plants and is also sold commercially. Larger sized pipe are made by hand. Capacity of the plant is 60 to 70 tons per day of 36-in. diameter pipe. Sizes from 8- to 24-in. diameter are manufactured with or without reinforcing. Reinforcing cages are built up in the plant, using a Thomson production electric spot welding machine.

Crushed slag and bank sand are the aggregates used, both being delivered in trucks, and a 12-cu. ft. Blystone mixer is located on the floor level so that aggregates are readily discharged into it by wheelbarrow. Water is added into the mixer through a spray pipe, and the dry mix is elevated by skip hoist to the hopper feeding the chute which fills the concrete pipe molds.

Pipe are handled into three 20- x 74-ft. curing kilns by rubber-tired buggies and are steam cured in the winter. In the summer they are to be water cured.

Plant Officers

G. E. Bing, general manager of the plant, handles the sales of pipe. H. Crimmel, who was transferred from the Elmira, N. Y., plant, is in charge of production. Mr. Bing formerly was connected with the Ohio State Department of Highways, and Mr. Crimmel has been associated with the company in most of its plants during the past eight years.

Other plants owned by the company are located at Elmira, Syracuse, Rochester, and Binghampton, N. Y.; Sandusky, Columbus, and Cleveland, Ohio; New Martinsville, W. Va.; Somerset and Pittsburgh, Penn.; and Atlanta, Ga.

Interior of new concrete pipe plant showing new tamper machine, concrete mixer, and skip hoist, to the right

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MEDUSA PORTLAND CEMENT CO. has on display in the Sandusky, Ohio, public library an exhibit depicting the chemistry of cement and its history. Vials of crushed limestone, marl, clay and gypsum are arranged on a table with placards which explain that when burned in a kiln the resulting clinker is ground to a fine powder which is cement. Pictures show the processes through which the minerals pass, and concrete blocks show its water repellant qualities. A plaster cast of the trade mark, Medusa, forms the center of the display.

JAMES VAN VLIET, who operates the former Rosaire Cinder Block plant at Milton-on-Hudson, N. Y., has found a new market for concrete units in connection with the New York City reservoir project at Lackawack. He anticipates having in 1939 the largest business he has known and estimates that he will produce 500,000 units. The plant has been turning out stone tile blocks in large quantities for the water works project. He is also producing cinder block.

CLARKE & CLARKE, builders and contractors of Savannah, Ga., are making their own hollow concrete tile. This company has built a number of homes in Savannah, using a double wall construction of concrete tile with an insulating space between each wall. The outside surface is given a stucco coat.

Concrete Masonry Saw Has Many Applications

CLIPPER MANUFACTURING CO., St. Louis, Mo., displayed at the Concrete Industries Exposition an abrasive wheel masonry saw which is capable of cutting standard 8- x 8- x 16-in. concrete block

Masonry saw has many uses

to produce any odd size desired. The saw, of course, is also capable of handling cast stone, concrete roofing tile, concrete joists, and small diameter concrete pipe. It also may be used to cut concrete cores up to 6-in. diameter for making laboratory microscopic or crushing tests.

Enlarges Ready-Mix Plant

QUINN-ROBBINS CO., Boise, Ida., is reported to have enlarged its productive capacity during the winter months by doubling the size of the concrete batching plant and adding new weighing devices. Previously weighed batches had to be hoisted to a hopper, but in the new plant the mix is weighed in an overhead scale and dropped into mixer trucks.

LOUIS O'CONNELL CO., Tiffin, Ohio, a ready-mixed concrete plant completed in the spring of 1938, has been active in producing concrete for several large jobs. It is now filling a contract for 1500 cu. yd. for the new city building. Two 1½-cu. yd. Jaeger mixers are mounted on International and Reo chassis. The company also makes concrete blocks, burial vaults, and septic tanks.

THEODORE A. POLANSKY, formerly of Huntington, W. Va., has become sales manager of the Gulf Concrete Pipe Co., Houston, Texas, according to a recent announcement issued by Mrs. John T. Shea, president of the company. Mr. Polansky is a graduate of Texas A. & M. College, and is a member of the American Society of Civil Engineers. In 1915, he served as chief engineer of the Texas City Terminal and Transportation Co.

Truck Establishes Unusual Record

S. H. BACON MATERIALS CO., Los Angeles, Calif., has established a unique truck mileage record with a Ford V-8 unit purchased in 1935. This unit, equipped with heavy duty, two-speed driving axle, trailing axle and heavy duty dump body, had traveled over 400,000 miles at the close of 1938. In four years, the report states, the truck hauled approximately 100,000 tons of sand, gravel, cement and other building materials, averaging over 300 miles a day. The engine in this truck was changed six times, in accordance with the company's operating policy, and has given an average of 65,000 miles per engine.

A Growing Ready Mixed Concrete Business

CREW BUILDERS SUPPLY CO., Cincinnati, Ohio, with two plants, is one of the most active ready mixed concrete companies in this territory. Sixteen 2½-cu. yd. Jaeger transit mixers mounted on Mack chassis are operated out of the two plants. At the Norwood, Ohio, plant large cylindrical steel bulk cement bins are used. The Cincinnati plant is a four-compartment Erie aggregate plant with a double cement tank. Approximate material storage space of both plants is sufficient for 1000 cu. yd. of concrete per day capacity. Johnson and Erie weigh batchers and bins are used. Sydney I. Crew is sole owner. A complete line of masonry building materials is also carried, and all merchandising is done by their own sales force.

Bulk cement bin in front of aggregate bins. Norwood, Ohio, ready-mixed concrete plant of Crew Builders Supply Co.

Portable Batching Plant

HELTZEL STEEL FORM & IRON CO., Warren, Ohio, has announced the Model E-1 portable bulk cement plant. It is claimed that batching of cement is dustless due to the airtight canvas diaphragms between the valve and the batcher and a relief pipe, which automatically transfers the usual cement dust occurring during the batching operation back into the top of the bin proper. The batcher, having a capacity of 16 cu. ft., is equipped with a cone-type valve seated in sponge rubber to permit a rapid, even discharge of cement. A full-bin signal has a battery-operated buzzer convenient to operator's platform. Either a dial scale or a beam type scale may be used. The screw conveyor and elevator has a normal operating capacity of 30 tons per hour, and the bin holds 100 bbl., but extensions may be secured which increase the capacity to 150, 200, or 250 bbl. A 10-hp. gasoline engine provides power to operate the plant.

Cement batching plant designed for 1 and 1½-cu. yd. batches

In the illustration may be seen the screw conveyor, to the right, elevator, batcher, and full-bin buzzer signal on operator's platform.

Concrete Burial Vault Makers Show Progress

Pittsburgh Convention, May 9 and 10

By R. W. MEAD

Secretary, National Concrete Burial Vault Association

In spite of the lower death rate prevailing in 1938, the concrete burial vault industry showed a marked improvement in sales over 1937. There are certain sections of the country where concrete vaults are not used to the extent that they might be, due in some measure to the methods used in marketing them. Other reasons are a poorly manufactured product, inadequate equipment used in servicing, and disregard for the outside finish. Some manufacturers content themselves with making a worthy product, not realizing that the public eye is attracted by outside appearances.

Why so many manufacturers of concrete burial vaults have not taken a cue from casket manufacturers and dressed up their vaults is a problem of much concern. About 16 years ago a small group of concrete burial vault manufacturers gathered to discuss this as well as other matters to obtain public recognition of what they knew to be the best burial protection available. From this small group, the Ohio Concrete Burial Vault Association originated. Manufacturers from other states soon recognized what this Ohio association was accompiishing, asked and were given permission to join. In 1928 the number of members outside of Ohio nearly equalled the Ohio members, and a proposal was made that the organization be incorporated nationally. The Ohio members acted upon this favorably, and the National Concrete Burial Vault Association was formed.

H. A. Ledyard of Ashland, Ohio and J. H. Stuart of Bremen, Ohio, who had been most active in forming the Ohio association, were elected president and secretary respectively of the national body. Committees were named, the most important of them being the Membership committee, the Advertising committee, and the Public Relations committee. Every year, except 1932, has seen an increase in the membership of the association. The Public Relations committee and the Advertising committee, each year, have bent more efforts in acquainting the public with concrete burial vault protection, and the manufacturing members of NCBVA have profited from the work done by these committees. In later years other committees — Legislative, Transportation, Publication, News, and others — have aided in this campaign.

J. S. Hamilton, Chairman, Pittsburgh Convention Committee

A research made this past year develops the interesting fact that those who are members of the Association, as a result of these benefits, have been more fortunate in increased business than those remaining outside of NCBVA ranks. It takes power to make progress, and power impelled by a number of units cannot help but go forward.

One of the first moves of the National organization was to design specifications so that every angle of possible improvement might be made in underground burial vaults. Committees of the Portland Cement Association and the American Concrete Institute met with a committee of the National Concrete Burial Vault Association and formulated a set of specifications. These specifications have been examined by many engineers and have been pronounced by them to be most serviceable in the construction of high type underground burial protection.

The tenth annual National Concrete Burial Vault convention will be held in Pittsburgh, Penn., May 9 and 10, at the William Penn Hotel. Every concrete burial vault manufacturer in the United States and Canada is invited to attend. Any manufacturer may attend all regular sessions. A Reception committee will be in attendance to particularly look after those who are making their first convention appearance. J. S. Hamilton, 1817 Banksville Ave., Pittsburgh, Penn., is chairman of the Pittsburgh Convention City committee. Any letter addressed to him or to the secretary, R. W. Mead, 2275 Scranton Road, Cleveland, Ohio, relative to any matter pertaining to the convention will be promptly answered. The chairman of the Transportation committee is F. W. Kitz, 4619 Roscoe St., Chicago, Ill.; he will be glad to aid any one in giving information regarding travel from any point to Pittsburgh, whether by rail, auto, or plane.

H. E. Coburn, president of NCBVA, is an example of the value of Association membership. Mr. Coburn started in a very small way in the manufacture of concrete burial protection. He has attended every convention for the past ten years and has stated many times that meeting with older manufacturers at conventions and getting their views, has had a marked influence upon his business career. Today Mr. Coburn owns one of the largest factories in the country devoted exclusively to the manufacture of underground burial vaults. His position today in the concrete burial vault field testifies to what may be done by strict attention to correct methods of manufacturing, making a finished salable product, fair dealing with the funeral directors and the public, and an alliance with a National organization where unity of purpose makes forward strides.

Pittsburgh Will Be Convention City

Immediately after the last convention the Pittsburgh Convention City committee began to plan a program for this decennial convention. Because of the many institutes and laboratories in Pittsburgh, it has been possible to arrange a greater educational program, not only from the standpoint of manufacturing but from the standpoint of sales approach. More can be learned from attending this convention on May 9 and 10 by the average manufacturer than could be acquired by him in a year's reading. Every manufacturer of concrete burial vaults who has his heart in his work, who wishes to increase his sales, and is desirous of building a concrete burial vault that will give the burial protection the public wants owes it to himself, as well as to the public which he serves, to attend this concrete vault convention on May 9 and 10.

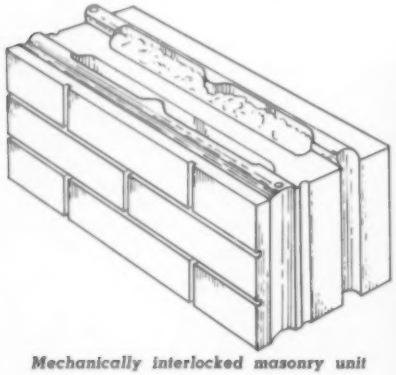
New Equipment and Products

Machinery and product developments shown at the Concrete Industries Exposition in February and not previously mentioned in the March issue of ROCK PRODUCTS are given below:

CLARK EQUIPMENT CO., Battle Creek, Mich., has brought out a Truclift model which has been designed particularly

Self-propelled truck has shock absorbers to prevent breakage of block

to meet the transportation problem of the concrete products producer in moving "green" block from the machine to the kiln and from the kiln to storage. In addition to the usual features, a spring-suspended platform and rubber shock absorbers give protection against



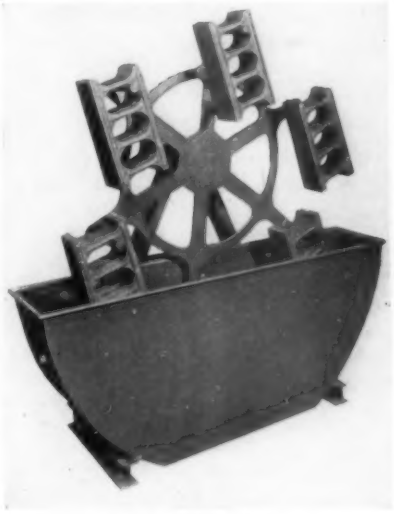
Mechanically interlocked masonry unit

all shocks and jars. Heavy coil springs, held under tension, support the 29½- x 66-in. platform, and four resilient rubber insulators absorb shocks should the operator bump into the racks when picking them up. The power plant is a 4-cyl. gasoline engine capable of propelling the vehicle at 6 miles per hour with a two-ton load. It has a turning radius of 8 ft.

J. J. O'LEARY, Buffalo, N. Y., displayed his patented design concrete block which is shown in the illustration. It will be noticed that it is a mechanically interlocked unit with which the use of mortar as a strengthening bond is not relied upon. Mortar or a mastic elastic cement, however, is used as a seal. A slightly depressed groove is provided between the interlocking ribs on the upper side of the unit to remove any moisture which may come through the joints although it is claimed that the units when laid up without mortar in the joints are waterproof against a direct water pressure of 50 lb. Any moisture penetrating the wall is carried down by means of the depressed groove to a drainage channel in the blocks and does not go through the wall. Units may have a plain, ribbed or fluted surface, and are produced with the face of the unit in ashlar, herringbone or conventional brick formation and in colors, as desired. It is also produced with a cast outside finish and with a back or inside wall of unit of a nailable material.

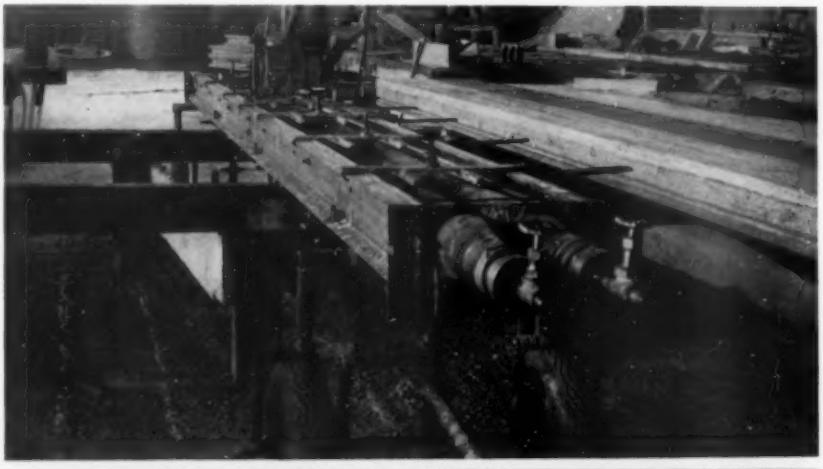
PRICE BROTHERS CO., Dayton, Ohio, supplied the accompanying illustrations showing the Flexicore equipment set up for the production of concrete floor joists and the joists in position on a foundation. A sketch showing the rubber hose in inflated and deflated position in the form was shown in the March issue of ROCK PRODUCTS.

THE KENT MACHINE CO., Cuyahoga Falls, Ohio, exhibited their latest model pallet cleaner and oiler which is said to be adaptable to any machine that uses cored pallets. As it does not occupy much space, it can be placed adjacent to the block machine within easy reach of the operator. It is also adaptable for cleaning and oiling extra pallets which



Pallet oiler and cleaner

are to be stacked for future use. No power is required to operate the pallet cleaner and oiler. As the pallets are hung on the pins and as they are taken off for use in the block machine, the



Above: Flexicore system for manufacture of concrete joists and conduits. Below: Concrete joists made by this system installed on foundation

spider rotates by gravity, passing the pallets through a bath of oil in the tank. Discarded crank case oil may be used for this purpose.

Modernistic Ready-Mixed Concrete Plant

GOLDEN GATE ATLAS MATERIALS CO., San Francisco, Calif., has erected at Daly City what is perhaps the most unique ready-mixed concrete and sand and gravel plant in the country. The structure, 60 ft. high and 150 ft. long, is finished modernistically in sheet metal and white stucco. There are five storage bunkers for aggregates with a capacity of 75 tons each; four batching bunkers, each of 60 tons capacity; a 1500-bbl. cement silo divided into four compartments for different kinds of cement; and modern batching and ready mixed concrete equipment. Carroll Stephens is general manager; S. L. Crawford, branch manager; and F. E. Jameson, plant superintendent.

Portable Proportioning Plant for Large Order

CONSOLIDATED ROCK PRODUCTS CORP., Los Angeles, Calif., erected a portable proportioning plant with ground storage bins and cement handling equipment at the site of the Los Angeles Union Passenger Terminal to facilitate its part in the construction. All materials were received in railroad cars and unloaded as needed directly into ground storage or the bins. Since the pouring of concrete was started in 1935, 300,000 sacks of cement and 92,000 tons of sand and gravel have been used. "Spec" Harkness was in charge of the plant.

Steel Company to Make Lightweight Aggregate

CELOTEX CORP., Chicago, Ill., has made arrangements with the Carnegie-Illinois Steel Co., whereby the steel company will add $60,000 worth of equipment to their Gary, Ind., plant to manufacture Pottsco lightweight aggregate. Capacity will be approximately 200,000 tons annually.

Apportion Federal Road Funds for 1940

ANNOUNCEMENT has been made by the Department of Agriculture that $135,000,000 has been apportioned for highway funds during 1940, comprising $100,000,000 for Federal aid roads, $15,000,000 for secondary or feeder roads, and $20,0000,000 for grade crossings. The department also announced that $1,000,000 had been allotted for the improvement of main roads through unappropriated or unreserved public lands, non-taxable Indian lands, or other federal reservations other than forest reservations. This sum is authorized for the fiscal year beginning next July by the act of June 8, 1938. States participating in these funds are: Arizona, $154,949; California, $94,859; Colorado, $37,837; Idaho, $52,015; Montana, $55,200; Nevada, $212,442; New Mexico, $84,982; North Dakota, $12,925; Oklahoma, $11,048; Oregon, $60,542; South Dakota, $19,763; Utah, $108,843; Washington, $14,512; Wyoming, $80,083, according to government reports.

Plan Concrete Pipe Plant

ZANESVILLE, CONCRETE PIPE CO., Zanesville, Ohio, has been recently incorporated by Albert J. Rehl, Herman L. Minkin and H. W. Thompson to manufacture concrete pipe. An expenditure of $100,000 is planned this spring for the construction of a plant.

THE SPINDLER CO., Manitowoc, Wis., is erecting a ready-mix concrete plant at a cost of between $20,000 and $25,000.

J. J. COLLINS, Claxton, Ga., has installed and begun to operate a concrete block plant.

THIS WIRE ROPE NEVER HAD A CHANCE to give the full service of which it was actually capable. It was a victim of adverse working conditions. It was used on a sheave too small for its size and construction, and the high bending stresses imposed on the wires resulted in fatigue and premature failure. A condition of this kind (sheaves or drums too small) is both **unsafe** and **costly**.

In order to obtain the most economical service from wire rope, it is of vital importance that drum and sheave diameters are as large as possible.

Standard practice has established certain ratios for sheave and drum diameters for the various wire rope constructions, which are given in the following tables. All diameters are to be measured from bottom of groove.

It should be understood that diameters listed as "minimum" are not recommended. Sheaves and drums of recommended diameters, **or larger**, will give increased rope life—consequently, more economical service. Anything smaller than "minimum" is critical—for both efficiency and safety.

Rope Construction	Average Diameters Recommended	Minimum Diameters
6 x 37 Round Strand	27 times rope diam.	18 times rope diam.
8 x 19 Round Strand	31 " " "	21 " " "
6 x 19 Round Strand "Style B" Flattened Strand "Style G" Flattened Strand	45 " " "	30 " " "
6 x 7 Round Strand "Style D" Flattened Strand	72 " " "	42 " " "

This advertisement is published for the purpose of helping all wire rope users obtain safer and more economical service from their wire rope. We also publish a booklet *"Practical Information on the Use and Care of Wire Rope,"* and we would be glad to send a complimentary copy to anyone interested.

A. LESCHEN & SONS ROPE CO.

WIRE ROPE MAKERS • ESTABLISHED 1857

5909 KENNERLY AVENUE • • ST. LOUIS, MO.

NEW YORK	• • 90 West Street	SAN FRANCISCO	• 520 Fourth Street
CHICAGO	• 810 W. Washington Blvd.	PORTLAND	• 914 N.W. 14th Avenue
DENVER	• • 1554 Wazee Street	SEATTLE	• 3410 First Avenue South

New Block Plant

VINE GROVE, KY., has a new concrete block plant which has been started by M. H. Salsman and Edward Harper, local business men. All kinds and sizes of block are to be made, according to the announcement.

Builders' Supply Company Formed

CONSUMERS MATERIALS CO., 3716 Montgomery Road, Cincinnati, Ohio, has been organized. Associated in the business are Walter J. Heintz, formerly president of the Moores-Coney Corp.; George J. Marsh, formerly vice-president of the Cincinnati Builders' Supply Co.; George B. Sawyer, formerly in the cement business in West Virginia, and C. L. Smith, formerly sales manager for Moores-Coney Corp.

Large Demand for Cement from Grand Coulee

GRAND COULEE DAM is expected to require a large amount of cement during the 1939 season. CBI, general contractor to complete the Grand Coulee dam, poured about 850,000 cu. yd. of concrete in 1938 in addition to 4,500,000 cu. yd. poured by MWAK in the dam foundations. Under its contract CBI must still pour about 5,000,000 cu. yd. The "pouring year" at Grand Coulee averages 285 days. At that rate, CBI expects to pour considerably more than 2,000,000 cu. yd. in 1939.

Cash Prizes to Safe Workers

SUPERIOR PORTLAND CEMENT CO., INC., Concrete, Wash., will award ten $10 cash prizes to safe workers throughout 1939. The first $50 will be distributed on July 1, consisting of five $10 bills. Distribution will be made by lot, but only those who have worked without a lost-time accident will be considered eligible to participate in the drawing. Men will also be divided in departments so that not more than one prize will go to any one group of workers and the $50 will be distributed to all parts of the organization.

New Cast Stone Plaster

KARL PREIS, Chicago, Ill., has developed a decorative construction material known as Sparkle Stone Finish, made from portland cement and natural or artificial aggregates. When used as a jointless stone plaster, for precast ornamental stone, or for ornamental purposes, it is said to impart unusual color and sparkling effects.

To Make Bricks from Asphaltic Stone

CALROCK ASPHALT CO., with plant at Majors, Calif., has installed machinery to make bricks from bituminous rock material. This company also manufactures tile, paving material, and other products.

Two New Cement Storage and Distributing Plants

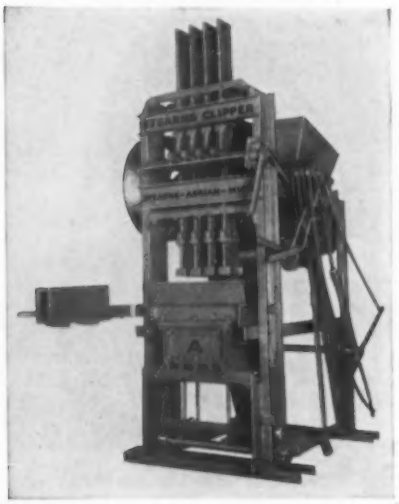
UNIVERSAL ATLAS CEMENT CO., Chicago, Ill., is now erecting a 30,000 bbl. cement storage and distributing plant at Green Bay, Wis. There are five storage silos. A similar plant will be erected at Muskegon, Mich.

Challenge Cement Cost Figures by State

M. C. MATTHEWS, plant manager of the Oklahoma Portland Cement Co., Ada, Okla., challenged the claim of certain Oklahoma legislators that cement could be produced for 50c a bbl. Mr. Matthews said that the actual cost per bbl. at his plant was approximately $1.50 a bbl., not including cost of delivery.

ZANESVILLE CEMENT PIPE CO., Zanesville, Ohio, is the name of a new company which will manufacture concrete sewer pipe. About 15 men will be employed.

JAHNCKE SERVICE, INC., New Orleans, La., is increasing its Brooks-Taylor lime putty plant by adding three new ageing tanks.



"ANCHOR"

Complete equipment for making concrete, cinder and other light weight aggregate units, including engineering service for plants and revamping of old ones for more economical service.

Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers, Stearns Joltcrete, Stearns mixers, pallets, Straublox Oscillating attachments, etc.

Repair parts for Anchor, Ideal, Universal, Stearns, Blystone mixers and others.

Anchor Concrete Mchy. Co.
G. M. Friel, Mgr. Columbus, O.

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A Good Market and Real Profits
Write for Details about Steel Forms
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CEMENT COLORS

RICKETSON'S
CEMENT COLORS
Since 1885
16 Standard Shades
"You can't Fade 'Em"
Write for samples & technical information
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STAR and ANCHOR COLORS
Geo. S. Mepham Corp., East St. Louis, Ill.
C. K. Williams and Co., Easton, Penn.

Here's → UNIVERSAL'S 11th PLANT

Equipped with a UNIVERSAL tamping machine, this plant produces 8 to 48-inch diameter concrete pipe of the highest quality. Capacity 60 to 70 tons of 36-inch pipe daily.

We have specialized in the manufacture of concrete pipe machinery and concrete pipe for more than 16 years. This experience assures you of complete satisfaction.

Send for illustrated catalog and details.

UNIVERSAL CONCRETE PIPE CO., Inc., Columbus, Ohio

Crushed Stone Association for Illinois Discussed

ILLINOIS, INDIANA AND IOWA crushed stone producers met in Chicago, March 16 at the invitation of Norman Kelb, Indianapolis, Ind., regional vice-president of the National Crushed Stone Association. A. T. Goldbeck, engineering director of the National Crushed Stone Association, and J. R. Boyd, administrative director, were present.

Mr. Boyd discussed the work of the association for the benefit of members, and there was some discussion of the desirability of organizing an Illinois association. Mr. Goldbeck briefly outlined the technical problems of the crushed stone industry in Indiana, which he has been very helpful in aiding the producers to solve, such as the use of crushed stone for resurfacing pavements and for stabilizing road bases in secondary highway construction.

Phosphate Activities in Tennessee

PROSPECTING for phosphates and purchases of tracts known to have phosphatic material has been active in Tennessee this Spring. One tract of land near Nashville was purchased from the Bensons by Monsanto Chemical Co. for $100,000, according to reports. It has long been known that scattered all over all the counties in the Middle Basin of Tennessee are large deposits of phosphatic material, but none of it has been commercially exploited to any extent until recently, except that which could be profitably mined by hand for lump rock. Well financed investors are now able to pick up tracts with good deposits at very reasonable prices, and apparently Monsanto, TVA, and the Charleston Co. are doing this while low prices prevail. The Charleston Co., mining branch of Victor Chemical Co., recently purchased three properties in the Scott's Mill valley and are reported as being about to extend their operations into that area. Movement of all grades of phosphate rock into all consuming channels continues active.

Additional Quarry Safety Trophy to Be Awarded

BUREAU OF MINES, U. S. Department of the Interior, has announced that an additional safety trophy will be awarded to be provided by "The Explosives Engineer" magazine, Hercules Powder Co. The bracketing of quarries and open-pit mines in the same group worked a hardship in the past, because the leading operation in safety achievement in each of these groups could not be appropriately recognized. This trophy will be available for the 1938 contest.

THIS KIND OF STEEL MAKING PUTS *FIGHT* IN ROEBLING SCREENING!

IT TAKES strong, tough steel to give long, economical operation—under the severe BEATING of stone and gravel screening service.

That's why Roebling's *custom-method* of steel making contributes so greatly to the performance of Roebling Wire Screening. It's a method by which the steel is painstakingly made in special small open-hearth furnaces—each lot carefully watched and controlled—to assure strict uniformity and the desired high degree of resistance against wear and vibration.

To assure you of wire screening that will provide the utmost of service—Roebling controls every process of manufacture from steel making to final fabrication!

We invite your inquiry for further information. Roebling Wire Screening is made in a wide range of types and metals for all cleaning, grading and sizing services.

JOHN A. ROEBLING'S SONS CO.
TRENTON, N.J. *Branches in Principal Cities*

ROEBLING ABRASO SCREEN

TRADE JERSEY MARK

90 YEARS OF WIRE MAKING SPELLS THE DIFFERENCE

NEWS of the month

Petoskey Installing Dust Collectors

PETOSKEY PORTLAND CEMENT CO., Petoskey, Mich., has been installing dust collecting equipment to collect and utilize the dust that has been lost through the stacks. Equipment comprises eight No. 28 and eight No. 30 Type D Sirrocco dust collectors, and the necessary induced draft fans, all furnished by the American Blower Co. Extensive building changes are being made to support and house the collectors.

Conveying and elevating equipment also is being installed to handle the combined dust collected by the collectors and that which is precipitated in kiln housings, boilers and economizers. This equipment, furnished by the Link-Belt Co., consists of drag and screw conveyors and rotor lifts. To feed the collected dust back to the kilns and to storage bins, screw conveyors in connection with Minogue flue dust feeders are being used. The Minogue flue dust feeders and the storage bins are being built by the Manitowoc Engineering Works.

To Recover Gold at California Gravel Plant

GRANT-PACIFIC ROCK CO., Lindsay, Calif., will install machinery to recover "flour" gold which has been found in new gravel pits opened up at the new screening and crushing plant. The plant will have a capacity of 150 tons an hour. Excavation in the 160-acre tract is by means of a 3 cu. yd. dragline loading into rail-operated dump cars that deliver the material to the plant conveyors. The deposit is 32 ft. deep, and is expected to provide enough material to operate the plant for 20 years. The Grant-Pacific Rock Co. is an affiliate of the Grant-Service Rock Co. and Pacific Aggregates, Inc.

Florida Cement Tax Held Unconstitutional

FLORIDA'S LAW imposing an inspection fee of 15c per 100 lb. on all cement imported into the State from foreign countries was held to be unconstitutional by the U. S. Supreme Court on February 27. The opinion, delivered by the new Justice Frankfurter, held that the assumption that cement coming from abroad must be inspected to safeguard the public safety, while 70 percent of the state's consumption produced domestically requires no such precaution, is "too violent" to justify the discrimination imposed. The court found that the purpose of the statute was to bar foreign cement from the state and held that this is beyond state jurisdiction.

Yosemite Quarry and Mill Improvements

YOSEMITE PORTLAND CEMENT CORP., Merced, Calif., has opened up a new deposit No. 4 at the quarry, and also installed a 4-ft. Traylor Type TY secondary crusher. In connection with this new deposit, about 2200 ft. of 500,000 c.m. power cable was installed. In the plant, the No. 2 kiln is being equipped with chains. Merrick clinker and gypsum weighing machines are being added to the finish end. Other equipment includes: a 16-ft. Raymond mechanical pulverizer air separator, and a 5-compartment Norblo air filter. Screw conveyors, elevators and motors required with the above equipment also are included in the expenditures. In connection with these improvements, the finish end of the building is being reconstructed. The entire expenditure is about $90,000.

Large Cement Order

ONE OF THE LARGEST ORDERS for cement recently placed by the U. S. Army Engineers office totaled $600,000, split equally between the Bessemer Limestone and Cement Co., Youngstown, Ohio, Diamond Portland Cement Co., Middle Branch, Ohio, and the Standard Portland Cement Co., Cleveland, Ohio. The cement is for the Mahoning Creek flood control project in western Pennsylvania.

Cement Plant to Produce Tallow Requirements

THE CARNEY CO., Mankato, Minn., has organized and will soon start operation of a subsidiary, The Mankato Rendering Works, Inc., to manufacture calcium stearate, a water repellent admixture used in making masonry cements. The plant is housed in a two-story building on property of the Carney Co.

Start Up Illinois Quarry

LA SALLE STONE CO., La Salle, Ill., is the name of a new crushed stone company located near this city. Cyphus Williams, contractor of Streator, Ill., and Alex Kelso, of La Salle, Ill., are interested in this new plant. Equipment valued at more than $50,000 has been purchased for the plant which will have a capacity of more than 60 tons an hour. Agricultural limestone and crushed stone are the principal products.

May Reopen California Cement Plant

PACIFIC PORTLAND CEMENT CO., San Francisco, Calif., may reopen the San Juan Bautista plant which has been closed since 1930, according to local reports. The reopening of the plant is said to be dependent largely on development of the Central Valley water project. Originally the plant was owned by the Old Mission Portland Cement Co. which was consolidated with the Pacific Portland Cement Company in 1930 and operations were transferred to other plants of the company, but the machinery was not moved.

Sand Rate Order Reversed

AN ORDER of the Pennsylvania Public Utility Commission that five railroads file new freight rates on sand shipped in open cars was reversed by the Superior Court, Philadelphia, Penn. The orders involved shipments on the Pennsylvania Railroad and Huntington & Broad Top Mountain from Tatesville, Penn., and on the Baltimore & Ohio Railroad, Coulddersport and Port Allegheny Railroad Co., and the Pittsburgh, Shamut Railroad Co.

Large Florida Quarry Now Completed

THE CAMP ROCK CO., near Brooksville, Fla., has completed construction of a quarry and processing plant which, it is reported cost approximately $250,000, and will have a capacity of 200 tons of rock per hour. The property comprises over 800 acres and the deposits have an overburden of only 3 ft. Water for washing will be obtained from three deep wells, using pumps with a capacity of 5500 g.p.m.

Ohio Has New Gravel Concern

NORTHEAST MATERIALS, INC., Jefferson, Ohio, is the name of the new company which has taken over the gravel and sand production and selling activities of Troyer Contracting Co. The company has been incorporated for $30,000. A washing and crushing plant is to be operated at a pit on the McGowan farm near Kingsville. Officers are: President, Roy S. Troyer, Aurora, Ohio; vice-president, Frank Felch, Monroe, Ohio; and secretary-treasurer, L. C. Bull, Andover, Ohio.

Universal Atlas Moving to New York

UNIVERSAL ATLAS CEMENT CO. is moving its headquarters from Chicago to New York on May 1, although a regional office will be continued here. Universal Atlas has grown up in Chicago from a very small beginning to a large corporation, one of the biggest subsidiaries of the parent United States Steel Corporation. The company started operations in the Chicago mill area in 1896. While the engineering department and others will be moved East, there will be two vice-presidents in charge of sales, an assistant treasurer, and several other officials with their staffs will continue to operate the regional office.

Grinding Raw Materials for High Magnesia Refractories

BASIC DOLOMITE, INC., Cleveland, Ohio, has entered an agreement with Canadian Refractories, Ltd., Montreal, Canada, to prepare raw materials for the production of high magnesia hearth refractories, Basifrit and Thomasite. A new Allis-Chalmers compeb mill was recently installed at the Maple Grove, Ohio, plant of Basic Dolomite, Inc., which will be loaded with 85,000 lb. of forged steel grinding media. The mill, which is 22 ft. long and 8- x 7-ft. in diameter, has a first compartment that will operate in closed circuit with a 4- x 6-ft. Allis-Chalmers Utah electrical vibrating screen. A 450-hp., 4000-volt synchronous motor is being furnished to drive the mill.

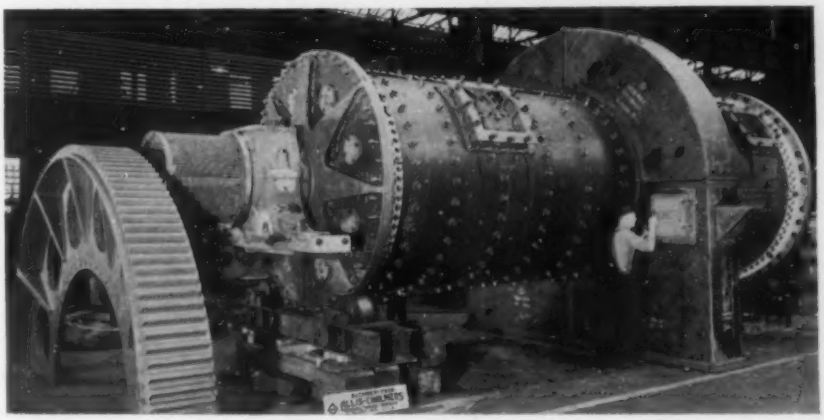
WPA Activities in Crushed Stone

KLEMMER CONSTRUCTION CO., Owatonna, Minn., has resumed rock crushing operations in the Windom township area. Between 20,000 and 30,000 cu. yd. will be produced for the county with WPA labor. Some of the townships may purchase part of their rock requirements.

KNOX COUNTY, MO., recently purchased a crusher which will be operated in the northern part of the county near Edina, Mo. The crusher has a capacity of 25 to 30 tons an hour.

SIX STONE QUARRIES are being operated by WPA near Cambridge, Ohio in connection with the county blanket road improvement project. Three are limestone and three are sandstone quarries. Last year the quarries furnished 57,040 cu. yd. of limestone and 35,746 cu. yd. of sandstone to surface roads in the county. In addition, 12,000 tons of gravel were used on the roads. The limestone quarries are: Scott, three miles south of Cumberland, Ohio; Smith, in Adams township; and Nesbitt, in Wills township. Sandstone quarries are: Peters, in Jackson township; Thompson and Ford, both in Center township.

MORE THAN 50,000 TONS of limestone aggregate will be used in the concrete at the Grand River dam project near Vinita, Okla. Jackson Material Co., Tulsa, Okla., has the sub-contract for quarrying and crushing operations at the Whitebird quarry.



Compeb mill ready for shipment to Basic Dolomite, Inc., Maple Grove, Ohio plant, to grind raw refractory material

Gypsum Production Shows Increase

BUREAU OF MINES reports for the fourth quarter and for the year show that while activity in the October-December period declined seasonally from the July-September period for the first time in 1938, it was better than in the similar period of 1937. This strong year-end position reflects the improvement in the construction industry during the last few months of 1938. Crude gypsum mined during 1938 totaled 2,671,281 tons as compared with 3,014,046 tons in 1937. Calcined gypsum produced in 1938 amounted to 2,221,056 tons, compared with 2,382,000 tons in 1937.

Stacker Conveyor Disposes Overburden of Quarry

IN A LARGE PENNSYLVANIA QUARRY a new method of removing overburden is employed. A huge Link-Belt mechanical, traveling stacker conveyor, having a span or reach of 250 ft. from overburden to spoil pile and capable of negotiating 7 percent grades by means of its crawler treads, is used in conjunction with a small, high speed power shovel. The excavating shovel discharges the overburden to a receiving hopper on the stacker from which an apron-type feeder conveyor handles the material uniformly to a 54-in. anti-friction stacker belt conveyor on the 190-ft. boom. It is said that the stacker conveyor will handle up to 800 tons of overburden per hour without spillage.

Gravel Officials Convicted

SENECA WASHED GRAVEL CORP., Buffalo, N. Y., and its officials had the misfortune to be convicted on eight counts in the true bill which alleged that the city was defrauded by the presentation of false vouchers for payment for loads of crushed stone which never were delivered to WPA projects. In addition to the corporation, those mentioned in the indictment included James J. Pendergast, Sr., secretary-treasurer of the company; Robert Pendergast, his son and an employe of the firm, and Roy G. Knox, former WPA supervisor. The jury recommended clemency for James J. Pendergast.

Florida Operators Start Educational Campaign

LIMEROCK ASSOCIATION of Florida, Ocala, Fla., has started a newspaper advertising campaign to acquaint the citizens of the State with the advantages of using Florida crushed stone as a paving material. Advertising will appear in nearly 150 daily and weekly newspapers of Florida. Leon B. Thrasher is engineer-director of the association.

FINANCIAL NOTES

RECENT DIVIDENDS ANNOUNCED

Arundel Corp.	$ .25	Apr. 1
Basic Dolomite, Inc.	.12½	Mar. 15
Ideal Cement Co.	.35	Mar. 31
Kelley Island Lime & Transp. Co.	.25	Mar. 31
Lehigh Portland Cem. Co.	.25	May 1
Lone Star Cement Co.*	.75	Mar. 31
Penn Glass Sand Co., 7% pfd.	1.75	Apr. 1
Schumacher Wall Board, pfd.	1.50	Feb. 15
Southern Phosphate Co.	.15	Mar. 31
Superior Portland Cem., Cl. A	.82½	Apr. 1
U. S. Gypsum Co.	.50	Apr. 1
U. S. Gypsum Co., pfd.	1.75	Apr. 1
Yosemite Portland Cem., pfd.	.10	Apr. 1

* The dividend reported in March for the Lone Star Cement Co., 25c should have been 75c, as given above.

NATIONAL GYPSUM CO., Buffalo, N. Y., reports earnings of $921,632 for the year ended December 31, 1938, compared with $687,428 for 1937. Approximately 57 percent of the earnings for the year was made in the last half of the year. Sales were about three percent less than those for 1937, the increased profits reflecting a reduction in costs, lower overhead and other economies, stated Melvin H. Baker, president of the company.

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LONE STAR CEMENT CORP., New York, N. Y. had a consolidated net profit of $3,060,436 for 1938, equal to $3.18 a share on common stock, compared with $4,079,825, or $4.24 a share in 1937. Earnings for the fourth quarter were $731,480.26, equivalent to approximately 76c a share as compared with $949,198.30 for the same quarter in 1937. Sales for the fourth quarter of 1938 totaled $5,019,893 compared with $4,878,913 a year ago.

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NORTH AMERICAN CEMENT CORP., New York, N. Y., for the year ended December 31, 1938, showed a net loss of $876,735 after taxes, interest, depreciation, depletion and other deductions, compared with a net loss of $580,212 in 1937.

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PENNSYLVANIA GLASS SAND CORP., Lewistown, Penn., showed a net profit of $435,643 for the year ended December, 1938, after depreciation, depletion, interest, amortization, federal income taxes, and other deductions, equal after preferred dividends, to 80c a share on 321,860 no-par shares of common stock. This compares with a net profit of $734,423, or $1.72 a common share in 1937. Net sales amounted to $2,244,968 in 1938, compared with $2,860,414 in 1937.

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NEW ENGLAND LIME CO., Adams, Mass., reports a net income of $275 for the year ended December 31, 1938. This compares with a profit of $20,092 for 1937. Net sales in 1938 were $442,704 as against $550,110 in 1937.

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MEDUSA PORTLAND CEMENT CO., Cleveland, Ohio, had a net loss of $55,154 in 1938, compared with a profit of $329,693 in 1937. In 1938 a total of $484,802 was spent for plant improvements. Purchase of 125 acres was made last spring near the York, Penn., plant, containing a large deposit of white clay to fortify the company against future need for raw materials.

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INDUSTRIAL SILICA CORP., Youngstown, Ohio, reported a net loss of $15,999 for the year ended 1938, compared with a profit of $195,607 in 1937. Sales were off about 55 percent from the previous year.

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YOSEMITE PORTLAND CEMENT CORP., Merced, Calif., reported a net profit of $64,194 in 1938, after all prior charges, against a 1937 net profit of $134,391. The lower net was due largely to higher costs arising from a railroad washout that cut off materials and forced outside purchases. For a time the company had to buy cement from other producers to fill orders. Sales in 1938 totaled $807,880 as compared with $828,118 in 1937.

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BASIC DOLOMITE, INC., Cleveland, Ohio, has reported to the SEC that on January 1, 1939, it had issued to the Society for Savings, Cleveland, a $275,000 note at 4½ percent from whom it had borrowed a like sum of money. The notes are dated January 1, 1939, with the sum of $16,000 payable quarterly beginning June 30, 1939, to be applied to interest and balance to principal, the remaining principal and interest to be payable in full on December 31, 1943. Notes are secured by a mortgage and pledge of operating plant and dolomite deposits, insurance of $200,000 on life of president, etc. Loan was issued for additions to and improvements in production facilities at Maple Grove, Ohio, plant.

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UNITED STATES GYPSUM CO., Chicago, Ill., reports that sales in the first two months of 1939 have been running well ahead of last year. Annual report figures were published last month. Sewell L. Avery, chairman of the company, stated at the annual meeting that the company in January earned a net profit of $241,000, after charges and taxes, compared with $108,000 in the same month a year ago. January sales were 20 percent above a year ago, while February sales were 13 percent above a year ago. Sales in 1938 amounted to $35,712,000, or 8.4 percent below the 1937 volume of $38,077,000.

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ROCKLAND-ROCKPORT LIME CO., Rockland, Me., showed a net loss of $14,390 for the year ended December 31, 1938, compared with a net profit of $14,830 in 1937. Net sales in 1938 amounted to $374,047 as compared with $535,090 in 1937.

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HAWKEYE PORTLAND CEMENT CO., Des Moines, Iowa, in its balance sheet for the year ended December 31, 1938, shows total assets of $1,934,805 as compared with $1,899,458. The operating deficit was listed at $314,390 as against $394,019 a year ago.

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AMERICAN SILICA SAND CO., Ottawa, Ill., reports a net loss of $73,785 for the year ended December 31, 1938. This compares with a net profit of $2,452 for the same period in 1937.

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EASTERN MAGNESIA TALC CO., INC., Burlington, Vt., reports a net profit of $19,761 for the year ended December 31, 1938. This compares with a net profit of $35,898 in 1937.

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MONOLITH PORTLAND MIDWEST CO., Los Angeles, Calif., reports for the year ending December 31, 1938, consolidated net income of $131,075, after depreciation, depletion, federal income taxes, etc. Net income for 1937 totaled $88,668.

•

COPLAY CEMENT MANUFACTURING CO., Coplay, Penn., showed a net loss of $49,851 for the year ended December 31, 1938, compared with a net loss of $65,635 for 1937.

•

PACIFIC COAST AGGREGATES, INC., San Francisco, Calif., showed a net loss of $114,241 for the year ended December 31, 1938. This compares with a profit of $4,827 for the year 1937. In spite of the fact that sales in 1938 amounted

to $1,945,221 as compared with $1,805,875, the operations showed a loss for the year. This is accounted for by an increase in the cost of sales item from $1,395,370 in 1937 to $1,508,525 and also an increase in the depreciation figure of $48,600.

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CONSOLIDATED OKA SAND & GRAVEL CO., Ltd., had a net loss of $42,078 for the year ended December 31, 1938, compared with a loss of $37,807 in 1937.

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BASIC DOLOMITE, INC., Cleveland, Ohio, had a net profit of $36,857 for the year ended December 31, 1938, after depreciation and depletion, as compared with $232,788 in 1937.

•

CELOTEX CORPORATION, Chicago, Ill., has announced the purchase of an additional 43,300 shares of the outstanding stock of the Certainteed Products Corporation which were purchased for $12.50 a share. The purchase brings Celotex's holdings in Certain-teed to 9,496 shares of preferred and 147,260 shares of common, or 24 percent of the total.

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NEW YORK TRAP ROCK CORP., New York, N. Y., showed a net loss of $91,047 for the year ended December 31, 1938, compared with a net profit of $33,840 in 1937.

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PENNSYLVANIA-DIXIE CEMENT CORP., New York, N. Y., reports a net profit for 1938 of $86,716 compared with $28,383 for 1937. The profit is equal to 71c a share on 121,200 nonpar shares of convertible preferred stock.

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MONOLITH PORTLAND CEMENT CO., Los Angeles, Calif., reports a net profit of $303,870 for the year ended December 31, 1938, after depreciation and provision for federal income taxes, as compared with $281,067 for 1937.

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SCHUMACHER WALL BOARD CORP., Los Angeles, Calif., for the three months ended January 31, 1939, shows a net profit of $38,672 after depreciation, amortization and provision for taxes, compared with a net profit of $40,001 for the second quarter ended October 31, 1938, and with a loss of $4,112 for the third quarter of the preceding fiscal year.

Reopen Iowa Quarries

VERRIPS & MCVEY CO., Pella, Iowa, have opened up their quarries located near Pella and Harvey, Iowa. Nick Bogaard will act as foreman of the quarry south of Pella and Fred Primick is foreman of the quarry south of Harvey. The stone will be used in surfacing farm to market roads in Marion County.

Large Highway Program for Ohio

STATE HIGHWAY DIRECTOR, Col. Robert S. Beightler, in a recent statement said that emphasis this year would be placed on improving main highways. Rehabilitation of these major roads, he said, would meet frequently heard criticism that Ohio has lagged behind other states in the building of high type road mileage and that it has over-emphasized development of secondary roads. Five U. S. highway routes and one State highway route will be improved. Parts of these highways will have to be reconstructed with new grades and alignments, and widening is to be undertaken in some places. In addition to this program, the WPA has approved a $12,500,000 expenditure for 2500 miles of secondary road construction. Work will start in April.

Gypsum Price Situation

FOLLOWING ANNOUNCEMENT that the price of gypsum plaster had been reduced by $1 a ton in the New York City area, quoting $18 a ton, rumors were current that a gypsum price war had started. Sewell L. Avery, chairman of the United States Gypsum Co., Chicago, Ill., at the recent annual meeting of his company said that prospects of a price war in the gypsum industry are no more likely than in any other competitive business. On the other hand, Melvin H. Baker, president of National Gypsum Co., Buffalo, N. Y., pointed out that major companies in the field were able to show a profit last year while operating at about 40 percent of capacity and stated it would be to the industry's advantage to hold prices steady and let profits grow as the result of greater volume. He indicated that an increase of around 30 percent in sales in 1939 might be expected.

Feldspar, Fluorspar and Pumice

VIRGINIA FELDSPAR CO., Bedford, Va., has installed a modern grinding plant to prepare feldspar for glass manufacturing. This plant will be completed on April 1. Robert H. Patterson is manager.

R. B. SPRUILL and associates of Salida, Colo., are completing a mill to treat fluorspar. The concentrates from the mill will be trucked to Brown's Canyon where it will be shipped by rail to the various markets.

PUMICE from the Entiat Valley, Entiat, Wash., may be used for insulation in the power house at the Grand Coulee dam. Several test loads have been taken from deposits on government land in the upper Entiat.

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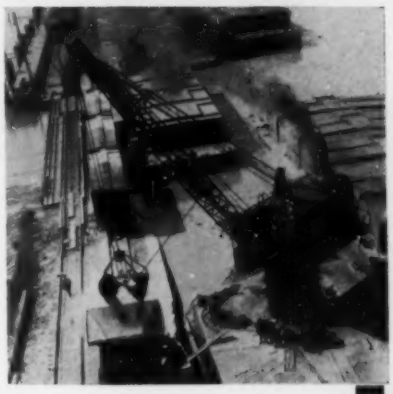

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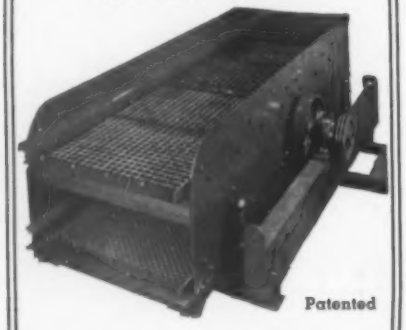

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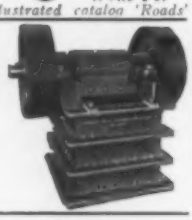

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Contractors Organize Quarry Company

A. & E. QUARRY CO., Marshalltown, Iowa, has been formed by Anderson and Empie, highway paving contractors, to take over the old Rockton quarries, five miles northeast of Marshalltown, Iowa. The quarry has been entirely re-equipped with new machinery. About 200 tons per day is the peak capacity of the plant.

Indict Concrete Pipe Concerns

THREE COMPANIES were charged by the City of Buffalo with irregularities in the sale of concrete pipe to the city. The defendant companies are Albany Gravel Co., Inc., Albany, N. Y.; Universal Concrete Pipe Co., Rochester, N. Y.; and New York Pipe Co., Warsaw, N. Y.

Cement Mills Start Up

EDISON CEMENT CO., Stewartsville, N. J., plant resumed operations recently after being closed about two months. A number of employes had been employed at the plant making repairs and improvements.

ALPHA PORTLAND CEMENT CO., Ironton, Ohio, closed down since early December, resumed operations on February 20, according to an announcement by F. C. Brownstead, superintendent.

OLYMPIC-PORTLAND CEMENT CO., LTD., Bellingham, Wash., is now operating at full capacity, and is shipping cement at the rate of 3000 bbl. a day to Coulee Dam. All three kilns and the Kendall quarry are in action, according to Superintendent A. F. Krabbe.

MONOLITH PORTLAND MIDWEST CO., Laramie, Wyo., resumed full operation after having been shut down for a few weeks.

LONE STAR CEMENT CORP., Bonner Springs, Kan., placed two kilns in operation on March 1. The plant had been closed since December 24, 1938. Extensive repairs and changes were made during the two-month shutdown. The Hudson, N. Y., plant was scheduled for reopening on March 15.

FEDERAL PORTLAND CEMENT CO., INC., Buffalo, N. Y., resumed production after a shutdown of several months.

MEDUSA PORTLAND CEMENT CO., Manitowoc, Wis., is expected to resume operation early in April.

GREAT LAKES PORTLAND CEMENT CO., Buffalo, N. Y., will place a kiln in operation on April 1.

UNIVERSAL ATLAS CEMENT CO., Northampton, Penn., plant was scheduled for reopening on March 16. This plant has been shut down for several months to make repairs.

Experts Talk Lime

(Continued from page 57)

able CaO, but each for an entirely different reason.

If the lime is not completely burned in the kiln, on cooling, the outside layers absorb CO_2 given off by the hot center; if the lime is burned at excessive temperatures, over-burning the exterior causes shrinkage of the lime and makes the escape of CO_2 from the interior more difficult. This discussion led to a description of lime kiln control in the interest of making *good* lime, as well as of making lime cheaply or efficiently.

In conclusion Mr. Azbe said that proper temperature conditioning of kilns helps beyond merely soft burning the lime; it stops slagging of the kiln lining, and temperature through the hot zone of the kiln is equalized and hot channels broken up. He said most lime should be burned at lower temperatures than at present; that most lime is overburned; that much improvement may be accomplished by merely reducing the size of the stone and increasing the frequency of the draw and through better facilities for trimming the kiln; that to accomplish most, temperatures must be controlled by recirculation of hot gases.

Lime in Construction

WALTER C. Voss, professor of building construction, Massachusetts Institute of Technology, Boston, Mass., also touched on burning temperatures for lime in his paper "Lime Characteristics and Their Effect on Construction." He said magnesium limes should not be subjected to temperatures above 1600 deg. F. and high calcium limes should be burned at temperatures below 2100 deg. F. The rest of his paper had to do with putty yields and volume changes in mortar, which have been covered in previous papers.

A summary of his findings are: 45 lb. is a rational average for 1 cu. ft. of lime solids; apparent putty yields are misleading and tend toward over-sanding; putties should be used on a "lime-solids" basis; waterproofed limes produce putty light in weight, therefore a fictitious yield, and a more porous structure; cement mortars require long periods of stabilization and always have greater expansion at a slow rate than do high-lime mortars; in these tests mortars made with dolomitic hydrates tended to shrink more than those with high calcium putties; mortars with high calcium putties have the lowest expansion after many cycles of wetting and drying, and stabilize rapidly; high-lime mortars show the most rapid initial expansion upon being wetted; high-lime mortars tend to increase in weight while decreasing in volume, indicating

carbonation and increased density; the initial permeability of concrete is reduced at least 50 percent by replacement of 10 lb. of cement by 10 lb. of lime solids.

Prices Bid - Contracts Let

ELYRIA, OHIO: The county will purchase 2000 tons of slag at a cost of $1.40 per ton without advertising for bids.

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YOUNGSTOWN, OHIO: Bessemer Limestone & Cement Co., Youngstown, Ohio; Diamond Portland Cement Co., Middle Branch, Ohio, and Standard Portland Cement Co., Cleveland, Ohio, were each given orders amounting to about 100,000 bbl. of cement at $2.01 per bbl. less 10c per bbl. discount, to be used for the Mahoning Creek flood control dam in western Pennsylvania.

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ASHTABULA, OHIO: The Lake Erie Milling Co., Ashtabula, was the lowest of seven bidders for approximately 1000 bbl. of cement to be used for WPA street improvement projects in the city and was awarded a contract. It entered a bid of $1.97 per bbl. delivered.

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CHARITON, IOWA: Agricultural limestone will be made available to Lucas county farmers through the Concrete Materials Co. of Cedar Rapids at the same prices effective for the program operated last year under provisions of the County Limestone Act. The price at the quarry will be 99c per ton if taken from the crusher and an additional 10c per ton if taken from the stock pile.

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FORT WAYNE, IND.: Thirty contracts for gravel supplies were awarded to be used by the Allen county highway department. The successful bidders, the pits, amounts of gravel to be furnished from each and the price per cu. yd. or ton were as follows:

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G. E. Leininger, Martin pit, 2500 cu. yd. at 50c per cu. yd.; H. A. Thomas, Thomas pit, 4000 cu. yd. at 60c; Geiger brothers, Geiger pit, 2000 cu. yd. at $1.25; John Dehner, Wesley chapel pit, 4500 cu. yd. at 80c; John Dehner, Kiel pit, 5500 cu. yd. at 70c; John Dehner, Foster pit, 1500 cu. yd. at 60c.

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G. E. Leininger, Prange pit, 5300 cu. yd. at 75c; Stonestreet-Burtzner, Shook pit, 2000 cu. yd. at 60c; Kimes-Kraft, Kraft pit, 2000 cu. yd. at 50c; Irving brothers, Irving pit, 4200 tons at 60c; Irving brothers, Bacon pit, 3000 tons at 60c; John Dehner, Porter pit, 1500 cu. yd. at 60c; H. O. White, Schwartz pit, 2000 tons at 60c.

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Joseph B. Wyss, Wyss pit, 2000 cu. yd. at 75c; William May, Sand Point pit, 2000 tons at 60c; H. O. White, Hildebrandt pit, 1000 tons at 67c; J. C. O'Conner, Alden-Street pit, 2000 cu. yd. at 70c; John Dehner, B-B pit, 1000 cu. yd. at 70c; John Dehner, Brandstrattor pit, 4000 cu. yd. at 80c; John Berghoff, Berghoff pit, 2000 cu. yd. at 63c; William May, Sutter pit, 2000 tons at 40c; John May, Weber pit, 2,000 cu. yd. at 50c.

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G. E. Leininger, I.O.O.F. pit, 1000 cu. yd. at 58c; Joseph Wyss, Wyss pit, 2000 cu. yd. at 75c; H. O. White, Octing pit, 11,000 tons at 67c; Union quarries, 2500 tons at 80c; France Stone Co., 2500 tons at 80c; Erie Stone Co., 2000 tons at 80c.

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NOBLESVILLE, IND.: At the rate of 78c per cu. yd., S. A. Hodgin was awarded a contract for 2306 cu. yd. of gravel to be used across the Boone county line from Clay township and 2041 cu. yd. of screened gravel, southwest of Lamong. The contract for 5000 cu. yd. of gravel southwest of Westfield, in Washington township, was let to C. C. Major at 78c per cu. yd. and 4000 cu. yd. in White River township near Walnut Grove was let to John Rupe at 70c per cu. yd. William W. Witt was given the contract for 3000 cu. yd. of screened and crushed gravel in Delaware township at 65c per cu. yd. and W. V. Barnhizer one for 4000 cu. yd. in Jackson township at 60c per cu. yd. Ben Huffman was awarded the contract for 2000 cu. yd. of gravel, at 75c per cu. yd. in Adams township. The Baker Gravel Co., Noblesville, received the contract for 3000 cu. yd. near this city at 75c per cu. yd. In the west part of Fall Creek township a contract for 2000 cu. yd. of pit-run gravel was awarded to J. C. Russell at 20c per cu. yd. and the Hiatt Gravel Co. received the contract for 1000 cu. yd. of gravel at 75c per cu. yd. in Adams township.

Cement Plant Improvements

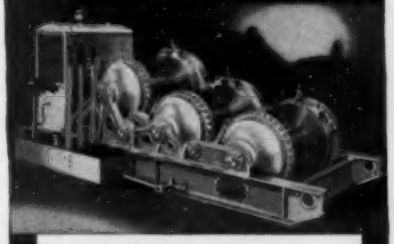
LONE STAR CEMENT CORP., has placed in service at its Hudson, N. Y., plant a 3 cu. yd. Marion electric shovel to load quarry cars.

SAN ANTONIO PORTLAND CEMENT CO., San Antonio, Texas, plans to erect an oil storage house adjacent to the engine room.

LONE STAR CEMENT CORP. plans expansion of its storage and packing plant at New Orleans, La., to include new silos, tanks, and conveying equipment costing about $50,000.

CALAVERAS CEMENT CO., San Francisco, Cal., is considering the use of natural gas fuel at its San Andreas plant, and is now investigating the possibility of piping the gas from the Rio Vista fields.

BUYING A HOIST?



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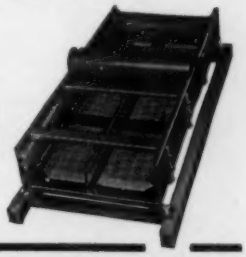

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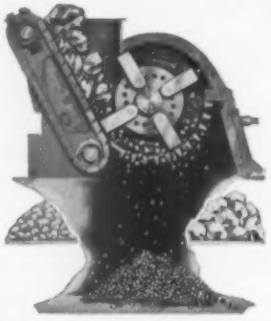

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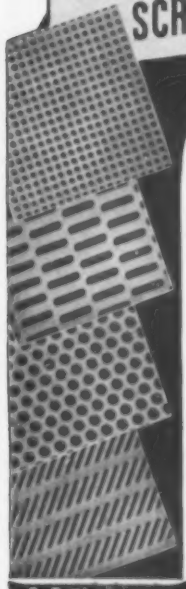

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5650 Fillmore St., Chicago—114 Liberty St., N. Y.

Cement Statistics for February

THE PORTLAND CEMENT INDUSTRY in February, 1939, produced 5,506,000 bbl., shipped 5,043,000 bbl. from the mills, and had in stock at the end of the month 24,080,000 bbl., according to the Bureau of Mines. Production and shipments of portland cement in February, 1939, showed increases of 40.6 and 10.2 percent, respectively, as compared with February, 1938. Portland cement stocks at mills were 1.2 percent lower than a year ago.

Total production for the two months ended February 28, 1939, amount to 10,807,000 bbl. compared with 8,450,000 bbl. for the same period in 1938.

Statistics here given are compiled from reports for February received by the Bureau of Mines from 161 manufacturing plants.

RATIO (PERCENT) OF PRODUCTION TO CAPACITY

	February 1938	February 1939	Jan. 1939	Dec. 1938	Nov. 1938
The Month	19.8	27.9	24.3	36.9	48.2
12 Months	43.7	41.9	41.3	41.0	40.6

Concrete Pavement Yardage

AWARDS of concrete pavement for February, 1939, have been announced by the Portland Cement Association as follows:

Type of construction	Sq. yds. awarded during Feb.	Total sq. yds. during first two months
Roads	685,609	2,770,999
Streets & Alleys	559,671	1,664,472
Airports	20,460	83,971
Totals	1,265,740	4,619,442

American Road Builders Meet in San Francisco

AMERICAN ROAD BUILDERS' ASSOCIATION held its annual convention and highway exhibit at San Francisco, Calif., March 7 to 10, in the Civic Auditorium. While most of the program concerned the problems of the highway engineer and road building contractor, several papers presented various methods of constructing stabilized roads and the aggregates and stabilizing ingredients used.

Inquiry for Ground Mica

FROM LONDON, ENGLAND, comes an inquiry for ground mica. The request for information reads as follows: "We are interested in finely ground mica, both for the wallpaper trade and for the rubber industry. Can you ask some of the mica firms to make us offers of ground mica suitable for both these trades, and to send us samples of their products with best prices? We should like these prices either c.i.f. London, or if they prefer it, f.o.b. ship at Atlantic port. We are merchants and are already doing business in ground mica, but we think the American product superior to the English, and we are therefore anxious to get into touch with first-hand American producers."

U. S. Inquiry Into Fertilizer Trade

AN INVESTIGATION is now being made by the Department of Justice into the commercial fertilizer industry covering "illegal combinations." Complaints have been made by farm organizations that monopolistic practices exist in the commercial fertilizer industry and that prices in the industry "have been maintained with such uniformity as to constitute corroboration of those complaints and to compel investigation." About 8,000,000 tons of mixed fertilizers are used every year by American farmers. Annual sales amount to more than $200,000,000.

Phosphate Industry in 1938

SHIPMENTS of phosphate rock from American mines in 1938, as reported by producers to the Bureau of Mines, totaled 3,739,238 long tons, valued at $12,894,180. This is a reduction of 200,000 long tons as compared with 1937. Exports rose slightly to 1,140,841 long tons, valued at $6,637,638. Decline in the Florida land-pebble shipments more than counterbalanced increases in the Florida hard-rock phosphate and Tennessee brown-rock phosphate industries. Phosphate rock was mined in Florida, Tennessee, Idaho, Montana, South Carolina, and apatite in Virginia.

Sand-Lime Brick Production and Shipments

NINE active sand-lime brick plants reporting for February and eight for January, statistics for which were published in March.

Average Price for February

	Plant Price	Delivered Price
Detroit, Mich.		$16.00
Grand Rapids, Mich.	$11.00	14.00
Milwaukee, Wis.	10.00	12.50
Mishawaka, Ind.	10.50	.....
Saginaw, Mich.	10.90	.....
St. Louis Park, Minn.	8.00	9.50

Statistics for January and February

	January†	February‡
Production	1,173,500	683,000
Shipment (rail)	152,000	78,000
Shipment (truck)	1,177,272	1,096,150
Stock on hand	915,861	1,389,511
Unfilled orders	110,000	1,825,000

†Eight plants reporting: incomplete, four not reporting stock on hand and six not reporting unfilled orders.

‡Nine plants reporting: incomplete, three not reporting stock on hand and four not reporting unfilled orders.

English Quarry Men to Visit N. Y. World's Fair

THE INSTITUTE OF QUARRYING, London, England is planning a trip to the New York World Fair. On July 21, the members will depart from Liverpool on the S. S. "Laconia," arriving at New York on July 30. After a week of touring the Fair and points of interest in and about New York City, the party will leave on the M. V. "Georgic" on August 5.

Testing Gravel for Central Valley

BUREAU OF RECLAMATION engineers have been testing gravel and sand deposits from Sacramento, Calif., north to the Oregon line for use in connection with the Shasta dam construction. No decision has been made as yet as to where the 7,000,000 tons of gravel and 3,000,000 tons of sand to be used in the dam and power house construction will come from for use in this Central Valley water project.

Cement Mill Operates Four Years Without Shutdown

COLORADO PORTLAND CEMENT CO., Portland, Colo., has operated four years without a shutdown, according to a local announcement. No major changes and improvements have been made in the plant since 1920 when storage silos were built. The company operates its own power plant and in addition to supplying its own electrical requirements also furnishes power for the town of Portland.

Lose Phosphate Patent Suit

SOUTHERN PHOSPHATE CORP., Baltimore, Md., lost a suit in the U. S. Circuit Court of Appeals at Philadelphia, Penn., according to recent court reports, when the patent owned by Phosphate Recovery Corp., New York, N. Y., on the "recovering" of phosphate was upheld. A patent owned by Southern Phosphate Corp. was ruled to be invalid.

Non-Suit Declared in Dust Damage Case

EDISON CEMENT CORPORATION, Stewartsville, N. J., has been fighting a dust damage lawsuit brought by Calegore Amore, Franklin township farmer. He sought $30,000 alleged damages, claiming losses by reason of the cement dust reducing the yield of his crops and injuring the quality of fruit and vegetables. The company introduced evidence to show that the cement dust actually improved the fertility of the soil. After three days of trial, a nonsuit was declared because the farmer had brought the suit in his name although the farm was actually owned and title existed in the name of his wife.

Grind Petrified Shell for Fertilizer

THE SHELL-LIME CO., Myrtle Beach, S. C., recently organized, is producing from "petrified shell" an agstone which is said to be much softer than ground limestone. The shell rock is excavated, passed through a dryer, screened, and then ground to a fineness almost equal to flour. Plant and deposit are located at White Point, S. C., but the office is at Myrtle Beach.

Glens Falls Adds Recuperators to Kilns

GLENS FALLS PORTLAND CEMENT CO., Glens Falls, N. Y., is now installing two Vanderwerp recuperators to operate in conjunction with two 10x250-ft. kilns. Heretofore, the discharge from these two kilns was transferred to a rotary cooler located at some distance from the kiln department, and this operation was not entirely satisfactory.

Building Cement Packing and Storage Plant

MEDUSA PORTLAND CEMENT CO., Cleveland, Ohio, is making rapid progress in the erection of nine cement storage silos at Holland, Mich., to handle lake shipments. The company also will build a packing plant and office building.

Sand and Gravel Shorts

BROOKS WRIGHT, INC., Preakness, N. J., sand and gravel producer, has gone into the ready mixed concrete business. Two Jaeger mixer units have been purchased.

BOULAY BROS., Fond du Lac, Wis., suffered a $15,000 fire loss at its sand and gravel distributing plant.

NEW PHILADELPHIA, OHIO, city council has authorized an expenditure of $2500 to purchase the Sam Hensel gravel pit near the city water works.

MUSKINGUM RIVER GRAVEL CO., Zanesville, Ohio, is constructing a river landing for unloading sand and gravel at Kenova, W. Va. A tramway will be built from the river's edge to the top of the bank for moving material from boats.

STANDARD SAND & GRAVEL CO., Wheeling, W. Va., has leased the Diesel towboat Dixie to haul sand and gravel.

OHIO GRAVEL CO., Cincinnati, Ohio, suffered damages of $7000 recently by fire at its Miamiville plant. The blaze, which was of undetermined origin, was extinguished by workmen.

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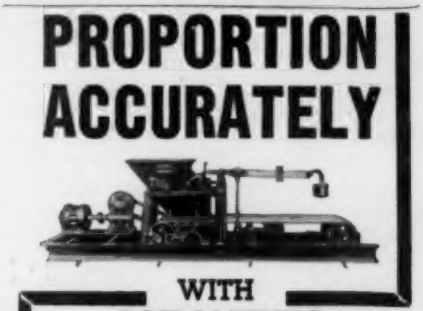
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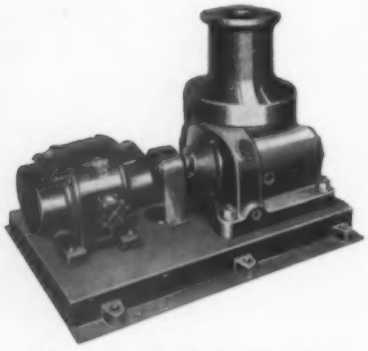
NEW MACHINERY AND EQUIPMENT

Car Spotters

LINK-BELT Co., Chicago, Ill., has designed two vertical-capstan electric car spotters, known as No. 5-A and No. 10-A, respectively, capable of 5000 lb. rope pull or moving one to three cars,



Vertical-capstan electric car spotter

and 10,000 lb. rope pull or with a capacity to move three to six cars, depending upon track conditions.

A high torque electric motor selected by the user is connected to the spotter drive mechanism by an encased flexible roller chain coupling, and mounted with the spotter on a welded steel base plate. The vertical capstan, made of semi-steel or cast steel, is machine finished to prolong the life of the haulage cable. A ratchet and pawl are furnished when required, mounted inside the capstan, for holding cars on an incline when the power is off. The No. 5-A spotter is equipped with a 5-hp. motor, and the No. 10-A machine requires a 10-hp. motor.

Improving Magnet Wire

GENERAL ELECTRIC Co., Schenectady, N. Y., has developed an improved type of magnet wire known as Formex. It is insulated with a synthetic resin which is said to be tougher and more flexible than the conventional enamel coatings. Among other qualities, it is claimed that the new wire requires less space for insulation and protection and that it has high resistance to abrasion, twisting, and common treating solvents.

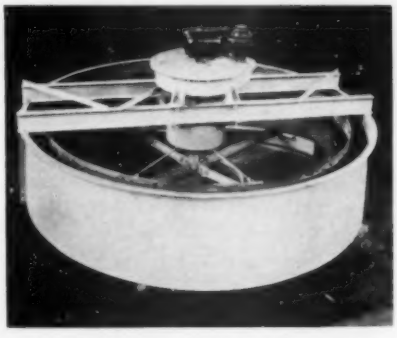
Combination Screening, Crushing and Loading Plant

PIONEER ENGINEERING WORKS, INC., Minneapolis, Minn., has developed a combination crushing, screening and loading plant which will produce road gravel, reject sand and produce crusher chips simultaneously. This unit, known as the Pioneer 48-V Duplex, is equipped with a 10- x 36-in. primary jaw crusher and Pioneer Super-40 secondary roll crusher, and has a capacity from 200 to 400 tons per hour of crushed, screened gravel. The bottom deck feed is said to double the specification screen area. Conveyors are equipped with low mast trucks with pneumatic tires. The plant is portable, being mounted on pneumatic tires with vacuum brakes. In the illustration, a Caterpillar Diesel tractor is furnishing power for the plant.

Crushing, screening and loading plant which will produce road gravel, reject sand, and produce crusher chips

Improved Hydro-Classifier

HARDINGE Co., INC., York, Penn., has brought out an improved hydro-classifier in which the driving head embodies a geared head motor and the cast iron housing upon which it is mounted. The use of a spur gear drive is said to add strength to the mechanism and permits forcing the scraper through the heavy solids, which are liable to pack, in the bottom of the tank. Sand, or oversize, in the classifier is delivered through a central opening in the bottom of the tank that is surrounded by a whirling vortex of water which, it is claimed, assures proper desliming of settled solids and a clean oversize.



Hydro-classifier with gear head motor drive

Control Level of Material In Bins

STEPHENS-ADAMSON MANUFACTURING Co., Aurora, Ill., has brought out a system of automatic storage control known as Tellevel. Control of level of material in bins is accomplished by the Tellevel starting or stopping the conveyors or elevators feeding the bin. Although operation is normally automatic, a simple change in wiring makes it possible to keep the flow of material stopped or continuous until the control switch is thrown.

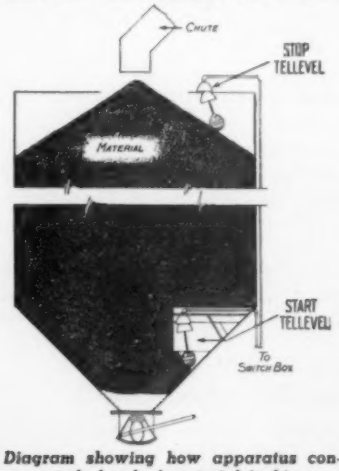


Diagram showing how apparatus controls level of material in bin

The Tellevel consists of three mercury switches in series with a sensitive, cast aluminum housing having a bakelite sphere which is contacted by material. The housing is suspended from above by a conduit pipe which permits the Tellevel to swing freely as the bakelite sphere is contacted by material.

Belt Cutter

ARMSTRONG-BRAY & Co., Chicago, Ill., has brought out a belt cutter designed to end the practice of cutting a square end on a power transmission belt with a pocket knife. This practice is wasteful as it very often takes several cuts to get the exact square end necessary to obtain uniform tension on a laced belt.

This new cutter handles leather, fabric and rubber belts up to 8-in. widths. The cutter holds the belt securely

Belt cutter permits squaring off ends with accuracy

against a side guide while a special knife is drawn down a track that assures an accurate square cut.

Rubber Ball to Reduce Screen Blinding

ALLIS-CHALMERS MFG. Co., Milwaukee, Wis., has designed what they have called, the Sta-Kleen screen, which is intended for use in screening moist material, such as fine crushed stone, ore, and coal, which frequently causes blinding of the screen. This new screen is said to reduce blinding to a minimum.

In this design, a secondary deck is built several inches below the screen. The lower deck is made of metal, perforated with comparatively large holes. The space between the screen and the secondary deck is divided into square or rectangular compartments and each contains a special rubber ball. When put into operation, the motion of the screen causes the balls to bounce rapidly between the screen and the deck. The rapid impact of the rubber balls against the screen sets up a secondary vibration that dislodges the moist materials from the mesh of the screen.

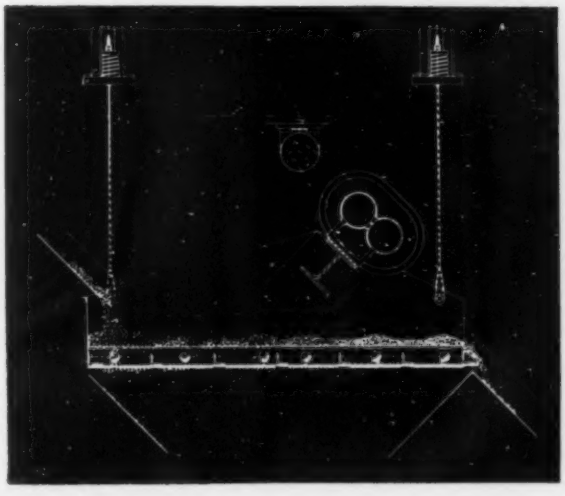


Diagram of vibrating screen in which the action of rapidly bouncing rubber balls reduces blinding to a minimum

Truck-shovel of ½ cu. yd. capacity may be easily moved from one location to another

Mobile Truck-Shovel Has Dual-Tandem Drive

MICHIGAN POWER SHOVEL Co., Benton Harbor, Mich., has introduced to the industry a ½ cu. yd. mobile truck-shovel which has dual tandem-drive traction. It is said to be easily convertible from shovel to crane, dragline, clam or trench hoe. Balance is achieved, according to the manufacturer, by a special chassis design which permits a very low center of gravity. Ball bearings are provided on turntable hook rollers and all drum shafts. Finger-tip air controls operate the shovel which swings in a full circle. By mounting the unit on a truck chassis, it may be quickly moved to a new location. Either gas or Diesel power is available.

Heavy-Duty, Chain-Drive Trucks of New Design

THE HUG Co., Highland, Ill., has brought out three heavy-duty, chain drive models designated Models 98-CD, 98-MB and 98-MA. Model 98-CD is a single rear-axle, chain-drive truck with a maximum gross vehicle weight of 60,000 lb., and comes equipped as standard equipment with a 10 to 12-cu. yd. body. The Model 98-MB is a dual chain-drive, rear axle model with a gross vehicle weight of 72,000 lb. and the standard equipment consists of a 16-cu yd. body. The model 98-MA also

Six wheel, heavy duty truck

is a dual rear-axle, chain-drive unit, with a maximum gross vehicle weight of 120,000 lb., and is equipped with a 25-cu. yd. body. Chain drive units furnished in these models are the Maxi chain drive units built by Six Wheels, Inc., Los Angeles, Calif.

Traffic and Transportation

PROPOSED RATE CHANGES—The following are the latest proposed changes in freight rates up to and including the week of March 11:

Central

56840. Cancel from N. Y. C. (West) Tariff 140-B, from origins in West Virginia named thereunder, to Norfolk, Va., and points taking same rates: Item 2740, **Limestone**, agricultural, C. L., from Charleston, W. Va. Item 2930, **Tripoli**, C. L., from Charleston, W. Va.

56841. Establish on **sand** (except naturally bonded molding; ground or pulverized sand) in open top equipment, C. L., Nickel, Ind., to Indiana Harbor, Gary, Ind., and South Chicago, Ill., 88c per net ton.

56861. Establish on **Limestone**, ground or pulverized, unburnt, C. L., min. wt. 60,000 lb., from Northwestern Ohio Group 1 origins, viz.: Carey, Danbury, Genoa, Gibsonburg, Luckey, McVittys, Marblehead, Martin and Woodville, O., to Neffs, O., 204c per net ton.

56884. Establish on (a) **sand**, naturally bonded moulding, in all kinds of equipment; **sand** (except naturally bonded moulding, ground or pulverized), in closed equipment; (b) **sand**, ground or pulverized, in all kinds of equipment; (c) **sand** (except naturally bonded moulding; ground or pulverized), in open top equipment (see note); C. L., from Ottawa, Ill., district (origins shown in Note 1, page 23, Agt. Kipp's Trf. 41-Y, to Ebenezer, N. Y., (a) 352c; (b) 387c, and (c) 352c per net ton. Note—Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in box cars are to be assessed.

56908. Establish on **crushed stone and crushed stone screenings**, C. L., Bluffton, Ind., to Columbus, Ind., 127c per net ton, via N. Y. C. & St. L. R. R.—Rushville, Ind.—N. Y. C. R. R.

56957. Establish on **crushed stone**, C. L., (See Note 3), Calcite, Mich. (near Rogers City), to Youngstown, O., 215c per net ton.

56977. Establish on **limestone, rough quarried**, not suitable for building purposes, in bulk, in open top cars, C. L., Alexandria, Ind., to Dover, N. J., 547c per net ton, via C. C. C. & St. L. Ry., Cleveland, O., N. Y. C. R. R., East Buffalo, N. Y., and D. L. & W. R. R.

57003. Establish on **limestone**, agricultural, and **screenings**, agricultural limestone, unburned, in bulk in open top cars only, C. L., McVitty's, O., to Ashtabula, 149c; Austinburg, Bellaire, Belmont, Cadiz, 160c; Carrollton, 149c; Conneaut, 160c; Mantua, 138c; Mt. Vernon, 110c; North Industry, 138c; Quaker City, 149c, and Smithfield, O., 160c per net ton.

57011. Cancel 60 percent of 6th class rating on **limestone**, crushed, ground or pulverized, not burnt; **limestone**, agricultural, crushed, ground or pulverized, not burnt, between points in C. F. A. territory, including Zone C territory in Wisconsin, and W. T. L. "Northwest" territory; also from points in aforesaid territories to points in T. L.-Arb. and T. L. A. territories, published in Item 7350 of C. F. A. L. Tariff 130-Z, 70 per cent of sixth class applicable to Canada to remain in effect. Classn. basis to apply.

57032. Establish on **sand** (except naturally bonded moulding; ground or pulverized sand), in open equipment, C. L., Michigan City, Ind., to Terre Haute, Ind., 149c per net ton, via C. I. & L. Ry., Limedale, Ind., P. R. R.

57087. Establish on **lime**, common, hydrated, quick or slaked, C. L., Detroit, Mich., to Girard, O., 17c, min. wt. 30,000 lb., and 13c, min. wt. 50,000 lb.

57079. Establish on **lime**, common, hydrated, quick or slack, C. L., Mitchell, Murdock and Salem, Ind., to Jeffersonville and West Point, Ky., 264c, min. wt. 30,000 lb., and 212c per net ton, min. wt. 50,000 lb.

57136. Establish on **sand** (except natural bonded molding, ground or pulverized), in closed equipments, and in open top equipment (see Note), C. L., from Vassar, Wampson, McHale, Juniata and Watrousville, Mich., to New Haven, Ind., 204c in open top cars and 220c per net ton in closed cars. Note—Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in box cars are to be assessed.

57138. Establish on **sand** (except blast, core, engine, foundry, glass, molding or silica) and **gravel**, C. L., in open top cars, LaFayette, Ind., to Dyer, Ind., 83c per net ton, via C. C. C. & St. L. Ry., Sheff, Ind., N. Y. C. R. R., Hartsdale, Ind., and M. C. R. R.

57139. Establish on **sand**, all kinds, and **gravel**, in open top cars, C. L., from Jackson and Coalton, O., to Philo, O., 116c per net ton, box car traffic, 133c per net ton, via B. & O. R. R. direct.

57143. To establish on **limestone**, crushed, ground or pulverized, unburnt, C. L., min. wt. 60,000 lb., Northwestern Ohio Group 1 origins, viz., Carey, Danbury, Genoa, Gibsonburg, Luckey, McVittys, Marblehead, Martin and Woodville to Cincinnati, O., 204c per net ton. For distance of 192 miles constructed on basis of carriers' revised scale in I. C. C. Dkt. 25220, plus Ex Parte 123 increase of 10 percent using Gibsonburg, O., as key point. Mileage figured 9 miles, Gibsonburg, O., to Burgoon, O., via P. R. R. and class rate distances of 183 miles beyond.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

Note 4—Reason: No present or prospective movement.

Note 5—Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in box cars are to be assessed.

Note 6—When a shipper orders a car of above mentioned marked capacities or greater, and the carriers are unable to furnish car ordered and furnish a car of greater capacity than that ordered, the min. wt. for the car furnished will be that which would have obtained had the car ordered been furnished and used.

57144. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing loam, molding and silica) and gravel, in open top cars, C. L. (See Note 3), except as otherwise provided, Marietta, O., to Huttonsville, W. Va., 187c per net ton, via B. & O. R. R., Bellington, W. Va., W. Md. Ry.

57161. Establish on (a) **sand**, naturally bonded moulding, in all kinds of equipment, C. L.; **sand** (except naturally bonded moulding; ground or pulverized sand) in closed equipment, C. L.; (b) **sand**, ground or pulverized, in all kinds of equipment, C. L.; (c) **sand** (except naturally bonded moulding; ground or pulverized sand), in open top equipment, C. L. (See Note), Ottawa, Ill., district to Wayne, W. Va., (a) 341c; (b) 375c and (c) 341c per net ton via C. B. & Q. or C. R. I. & P., Chicago, Ill., C. & O., Cincinnati, O., N. & W., other routes as requested by interested carriers. Note—Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in box cars are to be assessed.

57174. Cancel present rates of 458c per net ton on **stone**, viz., quarry scrap, rip rap and rubble; **stone screenings**, in bulk; **limestone screenings** (in bulk), and **stone dust**, C. L., Sandusky and Soldiers Home, O., to Moline and Rock Island, Ill., published in Item 600, B. & O. R. R. Tariff H3486-D, and similar rate in other individual lines' tariffs. Classn. basis to apply.

57187. Establish on **slag**, crude or granulated (the product of iron and steel furnaces), C. L., in open top cars, Pittsburgh, Penn., to Dover, N. J., 264c, and Alexandria, Ind., 226c per net ton, via available routes.

57318. Establish on (a) **sand**, industrial, in all kinds of equipment, C. L.; **sand** (except industrial (See Note 3), ground or pulverized), in closed equipment, C. L.: (c) **sand** (except industrial; ground or pulverized), in open top equipment, C. L. (See Note 5), but orders will not be accepted for closed and open cars of less marked capacity than 60,000 lbs. and 80,000 lbs., respectively (See Note 6), from Black Siding, Mich. (D. C. & S. Ry.), to destinations in the states of Mich., Ohio, Ind., Ill., N. Y., Wis., Penn., Ky., W. Va., Mo., and Ont. Can., rates on the scale prescribed by the I. C. C. in Docket 22907, observing the three-line formula except to destinations in Canada which are made on basis of the local rate to Detroit or Port Huron, Mich., plus the Canadian and specific beyond. Representative proposed rates are as follows (rates in cents per net ton):

To	Descriptions (a)	(c)
Buffalo, N. Y.	220	231
Chicago, Ill.	253	253
Cincinnati, O.	275	275
Detroit, Mich.	116	154
Indianapolis, Ind.	286	286
Louisville, Ky.	319	319
Milwaukee, Wis.	237	242
Parkersburg, W. Va.	308	308
Pittsburgh, Penn.	297	297
St. Louis, Mo.	352	352
Toronto, Ont.	336	363

57414. Establish on (a) **sand**, industrial in all kinds of equipment, C. L.; **sand** (except industrial, ground or pulverized), in closed equipment, C. L.; (b) **sand**, ground or pulverized, in all kinds of equipment, C. L.; (c) **sand** (except industrial, ground or pulverized), in open top equipment, C. L. (See Note 5); (See Note 6), Ottawa, Ill., district to Milford, Del., (a) 451c, (b) 496c, and (c) 451c per net ton, via C. B. & Q. or C. R. I. & P., Chicago, Ill., P. R. R. Other routes as requested by interested carriers.

57431 (2). Establish on (a) **sand** naturally bonded moulding, in all kinds of equipment, C. L.; **sand** (except industrial, ground or pulverized), in closed equipment, C. L.; (b) **sand**, ground or pulverized, in all kinds of equipment, C. L.; (c) **sand** (except naturally bonded moulding, ground or pulverized), in open top equipment, C. L. (See Note 5), Millington, Oregon, Ottawa, Sheridan, Utica and Wedron, Ill., to Atkins, N. Y., (a) 539c, (b) 585c, and (c) 539c per net ton.

Trunk

37390. **Limestone**, ground or pulverized, C. L., min. wt. 60,000 lb., from Natural Bridge, N. Y., to Norfolk, Va., $4.02 per net ton. Reason—Account of comparable rates from and to other points.

37395 (increase). Cancel from Toms River, N. J., to P. R. R. stations 120—Jersey City to 145—Bayonne stations, N. J., rates of $1.10 per net ton on **sand** (other than ground or pulverized or naturally bonded molding), in open top cars, without tarpaulin or other protective covering, C. L., $1.32 per net ton on sand (other than ground or pulverized), in closed cars, and sand, naturally bonded molding, in open top or closed cars, C. L., and $1.45 per net ton on sand, ground or pulverized C. L. (See Note 4.)

37403 (Sup. 1) (increase). Cancel all commodity rates on **crushed stone, trap rock and amiesite**, C. L., from stations on Rahway Valley Co. to stations in the state of New Jersey on L. V. R. R. (See Note 4).

37408 (Sup. 1). **Limestone**, ground or pulverized, C. L., min. wt. 60,000 lb., from Mill Creek, W. Va., to stations on B. & O. R. R. as follows: (Proposed rates per net ton) To B. & O. R. R., Shinnston, W. Va., 171c; Alton, W. V., 143c; Alexandar, V. Va., 143c; Wallace, W. Va., 171c; Dola, W. Va., 171c; Lumberport, W. Va., 171c; in lieu of current sixth class rates.

37411.(increase). **Crude dolomite**, C. L., (See Note 3), from Millville, W. Va., to Canton, Massillon and Cleveland, Ohio, $2.14 per gross ton. Reason: To restore former relationship in rates.

37420 (A). **Asbestos gravel, refuse** (1) or shorts (1); (B) **asbestos plaster** or finish and (C) **asbestos cement** or **fibre**, from Danville, Warwick and Sherbrooke (ex Q. C. Ry.), Que., to Irvington, N. J., (A) 29c, (B) 31c and (C) 40c per 100 lb. Reason: Comparable with rates from and to other points.

(1) Applicable only on material testing 0-0-5-11 or lower and so certified on bill of lading.

37429 (increase). Cancel commodity rate of 3¼c per 100 lb. on **shale**, C. L., min. wt. 50,000 lb., from Lockport, N. Y., to Beach Ridge, N. Y., as described in Item 4825 of N. Y. C. R. R. Tariff 18371, I. C. C. N. Y. C. 16769. Also to cancel commodity rate of 5½c per 100 lb. on shale, C. L., min. wt. 50,000 lb., from Albion, N. Y., to Beach Ridge, N. Y., as described in Item 12340 of N. Y. C. R. R. Tariff 18389, I. C. C. N. Y. C. 16776. (See Note 4).

37438. **Limestone**, ground on pulverized, C. L., min. wt. 60,000 lb., from Natural Bridge, N. Y., to Jarratt, Va., $4.13 per net ton in lieu of current sixth class rate of 40c per 100 lb.

37484. **Slag**, crude or granulated (the product of iron and steel furnaces), C. L., in open top cars, min. wt. (See Note 3), from Pittsburgh, Penn., to Dover, N. J., 264c per net ton, and Alexandria, Ind., 226c per net ton, in lieu of current sixth class rates. **Slag**, crushed or granulated, C. L. (See Note 3), from Niagara Falls, N. Y., to Dover, N. J., 264c per net ton, in lieu of current sixth class rate.

37484 (Sup. 1). **Slag**, crude or granulated (the product of iron and steel furnaces), C. L., in open top cars (See Note 3), from Bessemer, So. Duquesne, Munhall and Mifflin Jct., Penn., to Dover, N. J., 264c per net ton, and Alexandria, Ind., 226c per net ton.

37501. (A) **Sand** (other than ground or pulverized, or naturally bonded moulding), in open top cars without tarpaulin or other protective covering. (B) **Sand** (other than ground or pulverized) in closed cars. Sand, naturally bonded moulding, in open or closed cars, C. L. (See Note 3), from Foxburg and Emlenton, Penn., to Niagara Falls, Ont. (A) 275c and (B) 319c per net ton and to Hamilton, Ont., (A) 314c, and (B) 358c per net ton, in lieu of current sixth class rates.

37505 (increase). Cancel rate of 110c per net ton on **moulding sand**, from Depew, N. Y., to Rochester, N. Y., as published in Erie R. R. Tariff 19773 (See Note 4).

37506. **Crushed stone and screenings**, in straight or mixed C. L. (will not include agricultural limestone, unburnt, fluxing stone or firestone; or slag, coated with oil, tar or asphaltum), (See Note 3), from Pleasant Gap, Penn., to Painted Post, N. Y., 160c per net ton, in lieu of current sixth class rate of 20c per 100 lb.

37507. **Lime**, common, hydrated, quick or slacked, C. L., from Niagara Falls, N. Y., to Buffalo, N. Y., 210c per net ton, subject to min. wt. 30,000 lb. and 150c per net ton, subject to min. wt. 50,000 lb., in lieu of current sixth class rate of 11c per 100 lb.

37519 (increase). Cancel commodity rate of $2.20 per net ton from Engle, Martinsburg, Millville, W. Va., and Stevens City, Va., and $2.23 per net ton from Capon Road and Strasburg Jct., Va., to Richmond, W. Va., on **limestone**, crude, fluxing, foundry or furnace, when loaded in bulk in open top equipment, C. L., as published in B. & O. R. R. Tariff I. C. C. 23035, class rates to apply. (See Note 4.)

Southern

15755. **Lime**, Neosho, Pierce City, Sequiota and Springfield, Mo., also Johnsons, Ark., to New Orleans, La. To re-establish rate of 23c per 100 lb., min. wt. 30,000 lb. from Neosho, Mo., Pierce City, Mo., Sequiota, Mo., Springfield, Mo. and Johnsons, Ark., to New Orleans, La., on lime (calcium), viz., common lime, including magnesium lime, hydrated, quick or slaked C. L., in S. W. L. Tariff 227-A, I. C. C. 2825.

18300. **Soapstone or talc**, ground or pulverized, C. L. Established 270c net ton, Spruce Pine, N. C., to Port Wentworth and Savannah, Ga.

18322. **Superphosphate** (acid phosphate), crude, C. L., min. 70,000 lb. Establish 363c net ton, Wales, Tenn., to E. St. Louis, Ill., to alternate with present rate of 460c, min. 40,000 lb.

18391 (Amdt. 1). This submittal, included in Docket 977, assigned for Feb. 6th hearing, amended to suggest: **Talc and talc tailings**, C. L., min. 60,000 lb. Establish 78c cwt. Jasper, Tate and Canton, Ga., to Denver, Colo.

18426. **Ground phosphate rock, slush and floats**, C. L. Establish 806c gross ton from S. A. L. Ry., Fla. mines to points in Md. on the B. & E. R. R.

Illinois

IRC 5605-A. **Crushed stone, also rock, gannister**, C. L. To cancel following rates published in N. Y. C. R. R. Stone Tariff No. 1429-A, I. C. C. LS No. 1649: From Danville, Ill., to Joliet, Ill. (rock, gannister), 111c; Chicago, Ill. (crushed stone), 153c; Joliet, Ill. (crushed stone), 153c; account obsolete.

I. R. C. 6624-E. **Crushed stone, gravel and sand** (other than industrial), in open top cars, not covered by tarpaulin or other protective covering, min. wt. 100,000 lb., from C. M. St. P. & P. and C. & N. W. Ry. stations in Zones 1 (Crystal Lake, Hammond's, Ill., etc.), 2 (Beloit, Janesville, Wis., etc.) and 3 (North Lake, Wis., etc.) to Chicago switching district. Proposed—From Zone 1, 50c per net ton; from Zone 2, 55c per net ton; from Zone 3, 60c per net ton, for single line hauls. For connecting lines' deliveries rates to be 33c per net ton over the proposed rates for single line hauls. In addition to the proposed changes in the line haul rates referred to, the proposed rate of 50c from Zone 1 will be observed as maximum for single line switch movements at Chicago on the C. M. S. P. & P. or C. & N. W.

7496-1 (I. R. C.)—**Sand and gravel**, C. L., in open top cars (See Note 3), from Bloomington, Ill., to stations on Ill. Term. R. R.: E. St. Louis, Ill., 118; Edwardsville, Ill., 97; Springfield, Ill., 69; Peoria, Ill., 69; Urbana, Ill., 84; Danville, Ill., 111.

I. R. C. 8198-2. **Agricultural limestone**, also **ground limestone dust and limestone**, ground (See Note 3), from Lehigh, Ill., to Havana, Ill. Present—110c net ton. Proposed—99c net ton.

8660 (I. R. C.)—**Stone**. To cancel present rates published in Items 350 to 365, 375 to 390, 395 to 410, 500, 525, 555 and 580, 550, 915, of C. C. C. & St. L. Ry. Tariff 1733-J, I. C. C. 8719, from Alton E. St. Louis, St. Louis, etc., to various points, account obsolete. Classification basis to apply.

IRC 8746. **Sand and gravel**, C. L., from Forreston, Ill., to Proving Ground, Ill. Present, combination. Proposed—109c per ton.

Southwestern

15664. **Crushed stone, gravel and sand**, Kansas to Oklahoma. To amend Item 800, S. W. L. Tariff 162-M, J. R. Peel's I. C. C. 3046, to provide that distance scale of rates shown in Section 1 therein will also apply from stations in Kansas to stations in Oklahoma.

15655. **Lime** (calcium), Limedale Spur, Ark., to Cincinnati, Ohio. To establish rates of 23c per 100 lb., min. wt. 30,000 lb., alternating with 18c per lb., min. wt. 50,000 lb., on lime from Limedale Spur, Ark., to Cincinnati, Ohio.

New England

46322. (2-R)—**Ground granite**, (See Note 3), from Fitchburg, Mass., A, and Pepperell (F). Mass., B., to destinations in Trunk Line and Central Freight Association territories, representative destinations and rates shown below: To Baltimore, Md., A, 17 B, 18; Pittsburgh, Penn., A, 21 B, 21. Syracuse, N. Y., A, 14 B, 15; Utica, N. Y., A, 13 B, 14; Washington, D. C., A, 18 B, 18; Watertown, N. Y., A, 15 B, 16; Chicago, Ill., A, S-25 B, 25; Chicago, Ill., A, D-24 B, 24; Cleveland, O., A, S-20 B, 20; Cleveland, O., A, D-20 B, 20; St. Louis, Mo., A, S-29 B,29; St. Louis, Mo., A, D-28 B, 28. Present—Class rates published in Agent Doe's I. C. C. 160 and 250. Reason: To enable New England shippers to compete with those located in other territories.

46259. (2-1-R)—**Crushed or broken stone**, C. L., min. wt. 70 net tons, except that where cars of lower capacity are furnished for carriers' convenience, the C. L. min. wt. will be the marked capacity of the car, from Winchester, Mass., to Worcester, Miss. (N. Y. N. H. & H. delivery). Present—75 net ton. Proposed—65 net ton. Reason—To enable the rail carriers to receive a haul on this material.

ON PETITIONS of the Gulf, Mobile & Northern and the Mississippi Railway the I. C. C. has modified its order so as to permit these lines to establish for the intrastate transportation of clay gravel from Gatesville to Jackson, Miss., and sand and gravel, in straight or mixed C. L., from Amory to Fulton, Miss., rates of 35 cents a net ton.

Dredge of Unusual Design Easily Dismantled

Underwood-Walker Co., has a somewhat unusual sand and gravel plant at Millbrook, Ala., seven miles north of Montgomery, Ala. Mr. D. Swan, superintendent for the past 15 years, recently designed and built a dredge and screening plant which is so constructed that it could be dismantled and shipped to a new location without much difficulty.

Supporting the dredge are six steel tank pontoons, each 6½- x 33-ft., with ⅜-in. steel on the bottom and ⅜-in. on top. Welded to the pontoons are saddles which are bolted to a steel I beam. The pontoons are easily removed from the superstructure and disconnected from the steel I beam by simply introducing into the steel tanks the necessary amount of water which will cause them to lower away from the structure above. Each tank pontoon has two valves, one for air and one for water.

The plant has a capacity of 180 tons of sand and gravel an hour with eight men, two of whom are on the dredge and six at the plant. A booster pump is used on land to help carry the load against the 45-ft. head. On the dredge is a 150-hp. 3-cylinder Fairbanks-Morse Diesel engine to drive the 10-in. Amsco pump, and on the shore is a 120-hp., 2-cylinder Fairbanks-Morse engine which drives the 10-in. Amsco booster pump.

Screening plant and sand settling tanks. There are no stockpiles, all material being loaded directly into cars. Excess fines are run back into lake

Material is pumped to the plant where it is received in a landing hopper 45 ft. from the ground. From the hopper, the material passes over a 3½- x 12-ft., double-deck gravity screen where part of the sand is separated out. The remainder is passed over a 4- x 12-ft., three-deck Allis-Chalmers vibrating screen which separates sand and gravel. Gravel is loaded directly into cars, and the sand passes into settling tanks. From there it is loaded into cars by means of spouts.

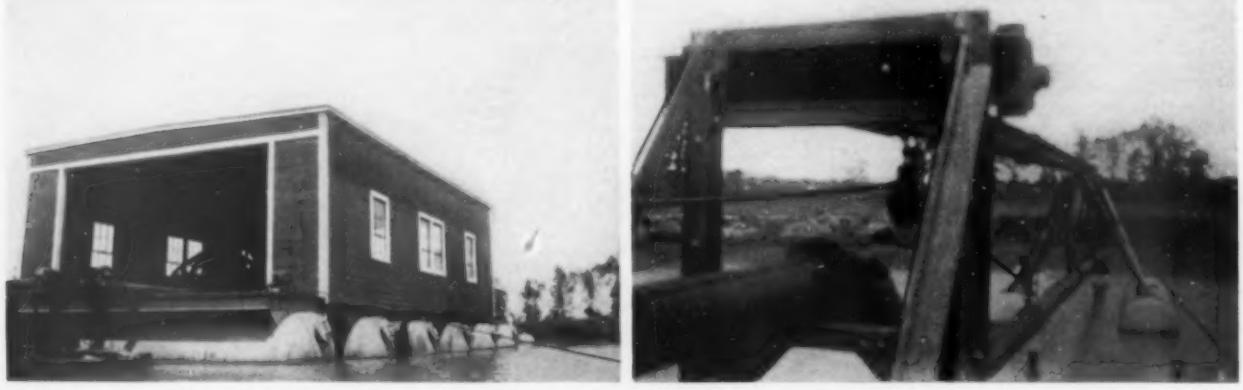
All materials are loaded from the plant directly to cars, no material being stockpiled. When sand is not wanted it is run back into the lake. Mr. Swan claims it is cheaper to repump it when there is a call for fines. A steam donkey engine and hoist are located where they may be used for spotting cars.

New Quarry Project in Colorado

A NEW COMPANY has been formed to open up a quarry in the Black Canyon of the Gunnison river, about 16 miles east of Delta, Colo. Millard Pritchard, Read, Colo., is president; Clarence Spalding, Delta, Colo., is secretary-treasurer; and C. L. Davis, Delta, Colo., is sales manager. The deposit is said to be a high calcium limestone and alabaster.

INTERNATIONAL ACETYLENE ASSOCIATION, New York, N. Y., held its annual convention in Houston, Texas, March 8, 9 and 10. Several papers of interest were presented on surface-hardening, and hard surfacing, and shape-cutting of various parts by means of the oxy-acetylene torch.

AMERICAN RAILROADS in 1939 will apply 1,000,000 cu. yd. more ballast than was purchased in 1938, according to *Railway Age*.



Left: Dredge with steel tank pontoons may be easily dismantled and taken to a new location. Right: Long intake pipe supported by a bolted steel frame assembly at the dredge boat end from which a pipe extends horizontally to an A frame and pontoons at the outer end, a series of pulleys and hoist raising and lowering the intake pipe as required

THE INDUSTRY

New Incorporations

Concrete Mixers, Inc., Morris Plains, N. J., has been incorporated with 200 shares of no par value stock. Agent is Mary H. Frank.

Passaic Stone Co., Inc., Kings, N. Y., has been incorporated by John E. Quis, 162 Northern Blvd., Flushing, N. Y., with a capital stock of 200 shares no par value.

Rock Products Co., Jacksonville, Fla., has been granted a charter. Capital stock is 100 shares,, $100 par value, and directors are H. C. Sedding, E. B. Eubanks and O. Buford.

Standard Silica Sand Co., Inc., of New Jersey, Larabee Crossing, N. J., is the name of a new corporation with a capital of $100,000. James A. Mewmeyer is agent.

New Albany Ready-Mix Concrete, Inc., 810 Fletcher Trust Bldg., Indianapolis, Ind., has been incorporated with a capital stock of 1000 shares, no par value, by Robert H. Tyndall, G. W. Morrow and G. R. Redding.

Florida Phosphate & Mining Corp., Ocala, Fla., has been granted a charter. Capital stock is 50 shares, $100 par value and directors are W. C. Pfeiffer, I. M. Bates and H. C. Dozier.

Pike Stone & Gravel Corp., Winslow, Ind., has been incorporated by Harcourt Scales, Eloise Killian and Cleo Scales with a capital stock of 1000 shares no par value.

Bayou Minerals, Inc., Houston, Tex., has been incorporated by W. B. Bates and W. H. Marshall with a capital of $100,000.

Cherokee Minerals, Inc., is the name of a new Hickory, N. C., corporation with a capital of $100,000. Incorporators are J. J. Hudiburg and Barrie Blackwelder, Jr.

Hillside Concrete Corp., Queens, N. Y., has been incorporated by Irving Lemov with a capital of 100 shares, no par value.

New York Concrete Corp., New York, N. Y., has been incorporated by Morris Hershson with a capital of $20,000.

The Stone Co., Decatur, Ga., has filed application for a charter with a capital stock of $2000 and with the right to issue additional stock to an amount not exceeding $50,000. William Rogers and Bruce Rogers are incorporators.

Manufacturers

General Electric Co., Schenectady, N. Y., has purchased 70,000 sq. ft. of land in Chicago, representing an expenditure of approximately $2,500,000, for the erection of a modern building to house its Chicago headquarters. The site occupies the block bounded by South Canal, South Clinton, West Cabrine and West Arthington Streets.

Johns-Manville Corp., New York, N. Y., announces the election of Robert W. Lea as a vice-president of the company. He will be in charge of finance and will take over the position formerly held by Enders W. Voorhees, who left Johns-Manville to become chairman of the finance committee of the U. S. Steel Corp.

Northern Equipment Co., Erie, Penn., has announced the appointment of Harry H. Weining as in charge of all research projects concerned with the Copes system of boiler feed control and allied equipment. He will be assisted by Francis W. Bunting and William E. Veenschoten.

Sullivan Machinery Co., Michigan City, Ind., has announced the election of Frederick W. Copeland as president. Mr. Copeland has resigned the presidency of the H. Channon Co., which he held since 1934.

United States Rubber Co., New York, N. Y., has announced a number of changes in the executive personnel of the wire department. P. Lewis, former Eastern district manager, wire sales, has been appointed assistant manager; H. H. Weber, assistant manager, has been appointed commercial engineer; H. J. MacDonald will succeed Mr. Lewis as manager, wire sales, for the company's Eastern district; and C. W. Short will take over the post formerly held by Mr. MacDonald, that of handling wire sales in the New England territory.

Dempster Brothers, Inc., Knoxville, Tenn., have assigned to Cornell & Mathews of Wilmington, Del., the distribution of Dempster-Dumpsters in Delaware, Maryland, the District of Columbia and Virginia.

The Marion Steam Shovel Co., Marion, Ohio, has announced that Louis Uhl is available as a consultant to quarry operators in the central territory. He is now concentrating his entire effort on this particular phase of the business and extends his broad experience to every stone quarry operator seeking a practical knowledge of stone quarry operation.

Louis Uhl

He is located at the company's home office at Marion, Ohio.

The Osgood Co., Marion, Ohio, has appointed Great Lakes Supply Co., 824 W. 36th St., Chicago, distributor for its excavating machinery in the Northern half of Illinois and the counties in Indiana adjacent to the Chicago territory.

Independent Pneumatic Tool Co. has elected Neil C. Hurley, Jr., president. He has been secretary of the company for the past four years.

Baker Industrial Truck Division of the Baker-Raulang Co., Cleveland, Ohio, has appointed Kinley D. Tracy assistant sales manager. He has been associated with the company for the past five years in charge of advertising and sales promotion.

Chain Belt Co., Milwaukee, Wis., has issued its annual report for the year ending December 31, 1938. Operations for the year resulted in a net profit of $436,763.26. In line with the general trend, sales declined approximately 26% and earnings, approximately 41%. All divisions operated at a profit, however.

Dow Chemical Co., Midland, Mich., has promoted Don Williams, former assistant sales manager, to the position of assistant general sales manager. He replaces R. L. Curtis, who has been transferred to the newly acquired subsidiary's plant — Great Western Electro Chemical Co., San Francisco. Harold Knowles is to fill Mr. Williams' former position.

W. W. Sly Mfg. Co., Cleveland, has appointed The Snyder Engineering Corp., 2444 E. 24th St., Los Angeles, Calif., and 2027 Vallejo St., San Francisco, as its representative.

Bucyrus-Erie Co., South Milwaukee, will be represented by The Beckwith Machinery Co., Pittsburgh, Penn., and by the Gulf Tractor & Equipment Co., Houston, Tex., in their respective territories.

Stearns Magnetic Mfg. Co., Milwaukee, announces that it will manufacture and sell Exolon machines. As heretofore, however, the Exolon Co. will continue their former activities on the Exolon separator.

Allis-Chalmers Mfg. Co., Milwaukee, announces the appointment of Erling Winsnes manager for the entire continent of South America with offices at Calle Peru 571-583, Buenos Aires, Argentine. Since 1918 Mr. Winsnes has been engaged in sales and engineering work in South Americe for Allis-Chalmers and for some years prior to that he had been connected with the engineering department of the company's mining division in Milwaukee. R. E. Diaz will succeed Mr. Winsnes as manager of the firm's district office at Santiago, Chile.

Erling Winsnes

Sprout, Waldron & Co., Inc., Muncy, Penn., has appointed H. K. Worthington, district sales engineer, to represent it in New York State.

Blaw-Knox Co., Pittsburgh, Penn., presented President W. P. Witherow's annual report in the form of a booklet which answers questions the employees are apt to ask about the company's administration. The explanation is clarified with graphs and pictures. Gross sales in 1938 amounted to $10,753,106; profits were $145,601 compared with $2,379,692 in 1937.

Dodge Division of the Chrysler Corp., Detroit, announces the appointment of Tom W. Moss as director of Dodge truck sales to succeed J. D. Burke.

Webster Manufacturing, Inc., Tiffin, Ohio, has been organized to succeed the Webster Manufacturing Co. and Weller Manufacturing Co., which had been operating under trusteeship for a period of several months. Officers of the new company are as follows: K. H. Waterfield, president and general manager; W. C. Doemel, vice president and production manager; Bert Jody, secretary; Charles S. Clarke, treasurer; C. S. Jones, chief engineer; L. A. Scheck, sales manager, and L. F. Maher, purchasing agent.

Easton Car & Construction Co., Easton, Penn., has appointed George D. Fraunfelder chief sales engineer.

New York Belting and Packing Co., Passaic, N. J., announces that the Northern Automotive Supply Co., Saginaw and Bay City, Mich., and Maty & Van Dyke, Inc., Klamath Falls, Ore., are now distributors of its line of mechanical rubber goods.

Barber-Green Co., Aurora, Ill., announces the reorganization of its sales department. B. E. Lindstrom, who for many years has been manager of the Chicago office, has been made district manager in charge of the central states. E. H. Cooper is now district manager of the southwestern states and E. L. Benson, is now district manager of the northwestern states. W. B. Holder continues as eastern manager.

Sioux City Planning Rock Wool Plant

TEST DRILLS have been made of rock deposits in the vicinity of Sioux City, Iowa, with the object of determining whether it will be advisable to build a rock wool plant. Samples of rock which have been tested indicate that the materials are suitable for rock wool manufacture, according to a statement issued by L. C. Dailey, secretary of the Chamber of Commerce.

Illinois Leads in Use of Agstone

ILLINOIS used approximately 1,250,000 tons of agricultural limestone in 1938, according to recent estimates, placing it in the front rank of all states in this use of crushed limestone. It is expected that 1939 will show an increase over 1938 in the application of agstone for soil-building purposes.

TRINITY PORTLAND CEMENT CO. has opened a sales office in the Fair building, Fort Worth, Texas, to conduct the sales for the Fort Worth plant. Previously all sales for the company were handled from the Dallas office. W. G. Hazen, long connected with the company, is in charge of the new office.

Trade Literature

The following literature, recently published, is available free, upon request to the respective sponsor:

Car Pullers, Hoists and Winches. — Stephens-Adamson Mfg. Co., Aurora, Ill., has issued a catalog which gives specifications, dimensions, and required information on how to select proper car pullers.

Lifts and Pulls.—Willamette Hyster Co., Portland, Ore., and Peoria, Ill. A 66-page booklet of this title contains photographs and diagrams which demonstrate the great variety of services that can be rendered by "Hyster" equipped "Caterpillar" track-type tractors. Of special interest is the presentation of the different methods for getting sand and gravel with "Hysters."

Concrete Pipe.—Concrete Pipe Machinery Co., Sioux City, Ia. Supplement No. 1 details its model T dual packer-head pipe making machine and Supplements No. 2 and 3, its portable dual packer-head machine.

Tractors.—Caterpillar Tractor Co., Peoria, Ill., has brought out a catalog, covering the entire "Caterpillar" line. The booklet gives brief specifications and operating data about every product built by the company.

Sand, Gravel and Crushed Stone Production Equipment.—Smith Engineering Works, Milwaukee, Wis., has issued an interesting, illustrated bulletin No. 266-L which describes the operation and features of its complete line of equipment. Also included is a questionnaire for an analysis of the particular problems of the quarry plant and gravel plant operators.

Speed Reducers—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Leaflet 2203-B presents numerous line drawings and installation photographs of their compact self-contained gearmotor speed reducers.

Welding Alloys and Overlay Metals.—Wall-Colmonoy Corp., Detroit, Mich. General catalog No. 70 describes the various Colmonoy alloys. Particular emphasis is placed on the durability of Colmonoy sweat-on paste and the ease with which it can be applied.

Dirt Moving Equipment and Crushing, Screening and Washing Plants.—Austin-Western Road Machinery Co., Aurora, Ill., has brought out a new catalog describing its 1939 line of equipment.

Calcium Chloride.—Solvay Sales Corp., New York, N. Y. "Calcium Chloride and Portland Cement" discusses the effects of calcium chloride on portland cement mixes and curing. In addition it contains data concerning the marked effects of varying temperatures on the strength of concrete.

Babbitt Metal.—Joseph T. Ryerson & Son, Inc., Chicago, Ill., has issued a bulletin which explains the physical structure of Glyco babbitt.

Batteries.—B. F. Goodrich Co., Akron, O. A new catalog section explains the construction and gives complete specifications on its line of heavy duty truck and bus and Diesel starting batteries.

Convertible Shovels and Dragline Buckets.—Bay City Shovels, Inc., Bay City, Mich., has brought out a catalog which contains its 25th anniversary story, reviewing its growth, development and progress. The booklet also contains a description, condensed specifications, working ranges and job pictures on all current models.

Pyrometers, Valves, Controllers.—The Bristol Co., Waterbury, Conn., has just published three new bulletins. No. 514 describes the Bristol air-operated synchro-valves for automatic control; No. 523 gives complete information regarding Bristol's model 6089V single-cam cycle controller; and No. 1452 presents information regarding the entire line of Bristol wide-strip pyrometer recorders and controllers.

Motor Application Chart. — The Louis Allis Co., Milwaukee, Wis., has issued a new motor application chart which lists 26 different types of motors and checks the proper type recommended for about 50 standard applications.

Electrical Equipment. — Westinghouse Electric & Mfg. Co., East Pittsburgh, Penn., has issued a number of bulletins describing some of its apparatus. Booklet B-2159 explains the uses, adaptations and developments of all types of Westinghouse geared drives; B-2164 describes synchronous motors in language the layman can understand; B-2175 describes the type M turbine for application in the 100 to 2000 h.p. range; descriptive data 3610 covers the Westinghouse gearmotors; and 3620, types SH and DH speed reducers; catalog section 47-225 covers type BR feeder-voltage boosters; and 47-230, type LR feeder voltage booster regulators.

Dryers.—Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill., has published a new 16-page, illustrated catalog, No. 1711, on its Roto-Louvre Dryer and the economical solution of materials drying or cooling problems through the use of this machine.

Industrial Trucks—Elwell-Parker Electric Co., Cleveland, Ohio, has issued two bulletins, one describing Elwell-Parker low lift platform trucks (bulletin No. A-8416), another the high lift platform trucks (bulletin No. A-8459), with illustrations showing typical applications to various industries.

Power Transmission Machinery.—Palmer-Bee Co., Detroit, Mich. A 48-page booklet covering manufacturing facilities and the line of power transmission and materials handling machinery and fabricated steel.

Power Pumps and Tube Washers.—Worthington Pump and Machinery Corp., Harrison, N. J. Bulletin No. W-423-B5 describes and illustrates the Worthington vertical triplex, single acting power pumps and bulletin W-200-B4, the Worthington hydraulic tube washer for surface condensers.

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Important as it may seem . . . fuel economy is *not the biggest profit* which accrues to owners of Cummins Dependable Diesels. Unless you *know* Cummins dependability, you will miss its biggest savings. ¶ One power failure can eat up the fuel savings on a dozen units. Behind the Cummins Dependable Diesel is a seven-year record for unfailing, day-after-day performance . . . a record that assures cheap dirt. ¶ With Cummins Dependable Diesels you can substitute certainty for hope . . . proof for expectancy . . . but be careful when you bid against Cummins Dependable Diesels. Cummins Engine Co., 3816 Wilson St., Columbus, Ind.

One of the six Model FC, Mack, 6-wheel units in service of International Nickel Company of Canada, Ltd., Copper Cliff, Ontario. Load, 130,000 pounds gross. Powered by Model HB-600 Cummins Diesels.

CUMMINS
Dependable
DIESEL
PIONEER IN MODERN DIESEL DEVELOPMENT

Classified Directory of Advertisers

For alphabetical index see page 118

Aerial Tramways
American Cable Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bethlehem Steel Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Hazard Wire Rope Co.
Leschen, A., & Sons Rope Co.
Roebling's, John A., Sons Co.,

Agitators
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Hardinge Company, Inc.
Hetherington & Berner, Inc.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Air Compressors
Allis-Chalmers Mfg. Co.
Fuller Co.
Gardner-Denver Co.
Nordberg Mfg. Co.
F. L. Smidth & Co.
Traylor Engineering & Mfg. Co.

Air Filters
Blaw-Knox Co.
Fuller Co.
Hardinge Company, Inc.
Roebling's, John A., Sons Co.
W. W. Sly Mfg. Co.
Western Precipitation Co.

Air Heaters
Babcock & Wilcox Co.

Air Separators
Babcock & Wilcox Co.
Blaw-Knox Co.
Combustion Engr. Corp.
Gruendler Crusher & Pulv. Co.
Hardinge Company, Inc.
Link-Belt Co.
Raymond Pulv. Div.
Smidth, F. L., & Co.
W. W. Sly Mfg. Co.
Western Precipitation Co.
Williams Patent Crusher & Pulv. Co.

Airveyors
Fuller Co.

Alloys (Metal)
Frog, Switch & Mfg. Co.

Ash & Refuse Handling Equipt.
Barber-Greene Co.
Easton Car & Constr. Co.
Gruendler Crusher & Pulv. Co.
Hetherinton & Berner, Inc.
Link-Belt Co.
Robins Conveying Belt Co.

Asphalt Mixing Plants
Easton Car & Construction Co.
Hetherington & Berner, Inc.
Koehring Co.
Traylor Engineering & Mfg. Co.

Backdiggers
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.

Backfillers
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.
Marion Steam Shovel Co.
Thew Shovel Co.

Bagging Machines
Smidth, F. L., & Co.

Balls (Grinding)
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Hardinge Company, Inc.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Barges
Chicago Bridge & Iron Co.
Eagle Iron Works

Batchers, Measuring Volume
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Fuller Company
Jaeger Machine Co.
Smith, T. L., Co.
Stearns Mfg. Co.

Bearings (Anti-Friction)
Chain Belt Co.
Eagle Iron Works
Hetherington & Berner, Inc.
Link-Belt Co.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Sons, Inc.

Bearings (Roller and Tapered Roller)
Easton Car & Construction Co.
Link Belt Co.
Robins Conveying Belt Co.

Belt Cutters
Flexible Steel Lacing Co.

Belting (Chain)
Chain Belt Co.

Belting (Elevator and Conveyor)
Austin-Western Road Machy. Co.
Bacon, Earle C., Co.
Barber-Greene Co.
Chain Belt Co.
Link-Belt Co.
Robins Conveying Belt Co.
Thermoid Rubber Company

Belting (Transmission)
Bacon, Earle C., Co.
Link-Belt Co.
Smidth, F. L., & Co.
Thermoid Rubber Co.

Belting (V Type)
Allis-Chalmers Mfg. Co.
Link-Belt Co.
Thermoid Rubber Company

Belt Fasteners or Hooks
Flexible Steel Lacing Co.
Robins Conveying Belt Co.

Belt Idlers
Link Belt Co.
Robins Conveying Belt Co.
Smith Engineering Wks.

Belt Lacing
Flexible Steel Lacing Co.

Belt Tighteners
Link-Belt Co.
Robins Conveying Belt Co.

Belt Trippers
Bacon, Earle Co., Inc.
Chain Bet Co.
Link-Belt Co.
Robins Conveying Belt Co.

Bin Gates
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Austin-Western Road Machy. Co.
Bacon, Earle C., Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Chicago Bridge & Iron Co.
Eagle Iron Works
Fuller Co.
Gruendler Crusher & Pulv. Co.
Hardinge Company, Inc.
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Hendrick Mfg. Co.
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Jaeger Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Pioneer Engr. Wks., Inc.
Smith Engineering Works
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Bin Indicators
Fuller Co.

Bins (Storage)
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Chicago Bridge & Iron Co.
Eagle Iron Works
Hardinge Co.
Heltzel Steel Form & Iron Co.
Hendrick Mfg. Co.
Hetherington & Berner, Inc.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Works, Inc.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Blasting Cap Crimpers
Ensign-Bickford Co.

Blasting Supplies
Atlas Powder Company
Ensign-Bickford Co.
Hercules Powder Co.

Block Machines, Building
Anchor Concrete Machinery Co.
Besser Mfg. Co.
Multiplex Concrete Machy Co
Stearns Mfg. Co.

Blocks (Pillow)
Allis-Chalmers Mfg. Co.
American Hoist & Derrick Co.
Chain Belt Co.
Link-Belt Co.
Robins Conveying Belt Co.

Blocks (Sheave)
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Link-Belt Co.
Pioneer Engineering Wks., Inc.
Roebling's, John A., Sons Co.,
Sauerman Bros.

Blowers
Allis-Chalmers Mfg. Co.
W. W. Sly Mfg. Co.

Boats
Chicago Bridge & Iron Co.

Boats (Self-Unloading)
Link-Belt Co.
Robins Conveying Belt Co.

Boilers
American Hoist & Derrick Co.
Babcock & Wilcox Co.
Combustion Engineering Corp

Brick Machines
Besser Mfg. Co.
Multiplex Concrete Mach. Co.
Stearns Mfg. Co.

Buckets (Clamshell, Grab, Orange Peel, etc.)
Blaw-Knox Co.
Bucyrus-Erie Co.
Hayward Company
Industrial Brownhoist Corp.
Jaeger Machine Co.
Link-Belt Co.
Robins Conveying Belt Co.

Buckets (Dragline and Slackline)
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Gruendler Crusher & Pulv. Co.
Hayward Company
Hendrick Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Sauerman Bros., Inc.

Buckets (Dredge & Excavator)
Blaw-Knox Co.
Bucyrus-Erie Co.
Hayward Co.

Buckets (Dump)
Brooks Equipt. & Mfg. Co. Inc.
Jaeger Machine Co.

Buckets (Electric Heated, Weighing)
Easton Car & Construction Co.

Buckets (Elevator and Conveyor)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Co.
Brooks Equipt. & Mfg. Co.
Chain Belt Co.
Eagle Iron Works
Gruendler Crusher & Pulv. Co.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jaeger Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Smith Engr. Wks.

Building Tile Machines
Besser Mfg. Co.
Multiplex Concrete Machy. Co.
Stearns Mfg. Co.

Bulk Cement Batching Plants
Heltzel Steel Form & Iron Co.

Bulk Cement Storage Plants
Blaw-Knox Co.
Heltzel Steel Form & Iron Co.
Link-Belt Co.
Smidth, F. L., & Co.

Bulldozers
Blaw-Knox Co.
Bucyrus-Erie Co.
Koehring Co.

Bullscrapers
Bucyrus-Erie Co.

Cable, Electric
General Electric Co.

Cableways
American Cable Co. Inc.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Bethlehem Steel Co.
Blaw-Knox Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Gilmore Wire Rope Div.
Hazard Wire Rope Co.
Jones & Laughlin Steel Corp.
Leschen, A., & Sons Rope Co.
Link-Belt Co.
Roebling's, John A., Sons Co.,
Sauerman Bros.

Calcining Equipment
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Hardinge Company, Inc.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Cars (Block, Dump, Industrial, Etc.)
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Bethlehem Steel Co.
Eagle Iron Works
Easton Car & Construction Co.
Link-Belt Co.
Multiplex Concrete Mach. Co.
Sanford Day Iron Works
Stearns Mfg. Co.
Traylor Engineering & Mfg. Co.

Car Couplings & Hitches
Easton Car & Construction Co.

Car Dumps
Eagle Iron Wks.
Easton Car & Construction Co.
Link-Belt Co.
Traylor Engr. & Mfg. Co.

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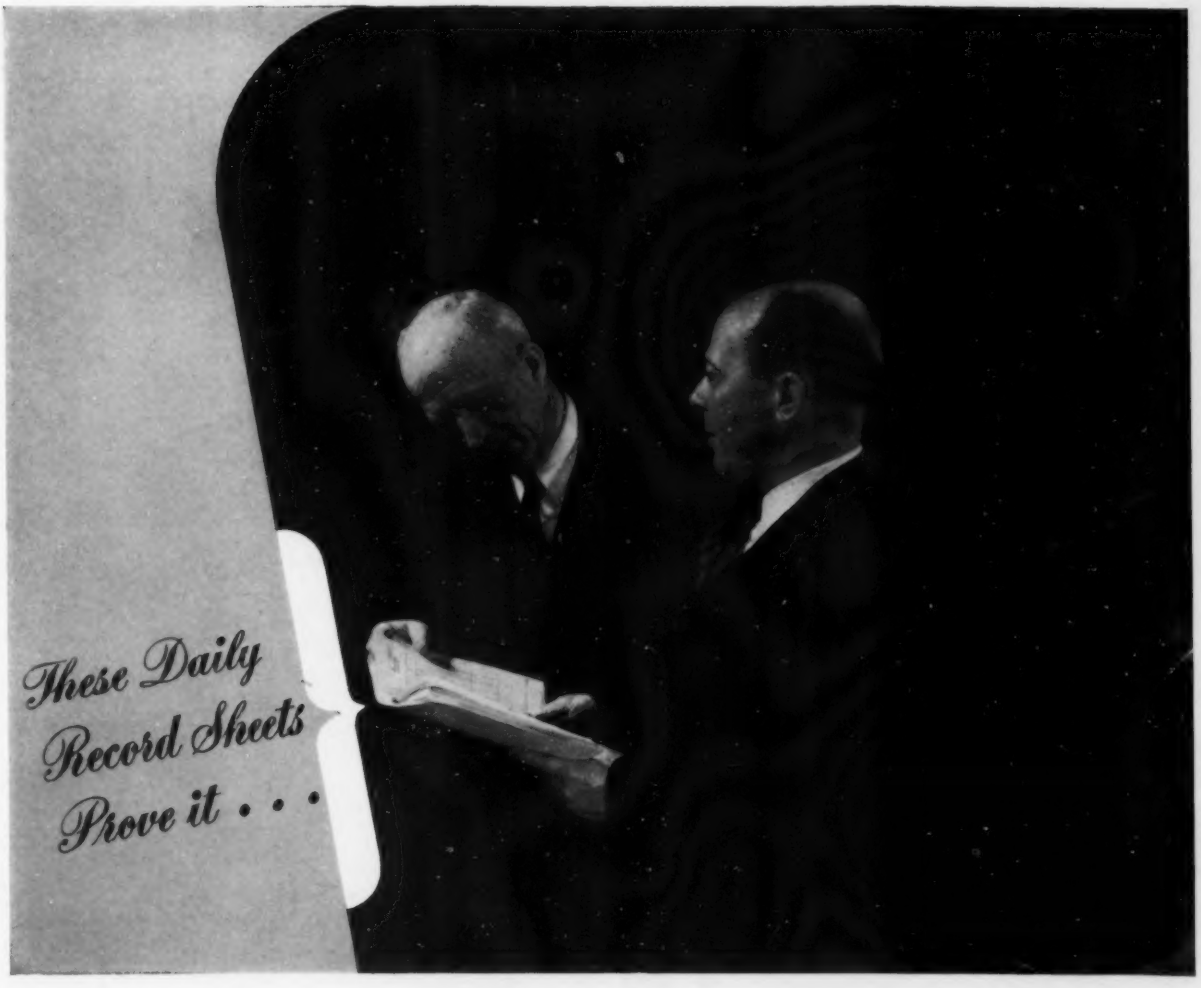
American Hoist & Derrick Co.
Chain Belt Co.
Gilmore Wire Rope Riv.
Jones & Laughlin Steel Corp.
Link-Belt Co.
Robins Conveying Belt Co.

Castings
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Bethlehem Steel Co.
Bacon, Earle C., Co.
Blaw-Knox Co.
Chain Belt Co.
Dixie Machinery Mfg. Co.
Eagle Iron Works (Grey Iron)
Frog, Switch & Mfg. Co.
Hardinge Company, Inc.
Hetherington & Berner, Inc.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Vulcan Iron Works

Cement Plants (Contractor)
Allis-Chalmers Mfg. Co.
Gruendler Crusher & Pulv. Co.
Hardinge Company, Inc.
F. L. Smidth & Co.
Traylor Engineering & Mfg. Co.



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"Our daily operating records have proved to us that Gulf's higher quality Diesel oil is the most efficient lubricant we have ever used," says this chief engineer. "Our bearing temperatures are lower and consumption is less than one-half as much as when we used a cheaper brand."

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Here is one important reason why Diesel engines everywhere make better operating records with Gulf's higher quality Diesel oils: *They are manufactured by the most modern refining methods used today.* Thus, the user is assured of lubricants which possess a margin of safety well beyond average requirements.

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GENERAL OFFICES: GULF BUILDING, PITTSBURGH, PA.

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● Don't let rock work drag down your profits! Get that rock out faster—and at lower cost—with Gardner-Denver Sinkers! They have the speed you need for quick drilling. They have the *dependability* required for uninterrupted, trouble-free operation. They are easy to handle . . . promote efficient work. They are low in air consumption. There is a Gardner-Denver Sinking Drill for every sinking job . . . a complete line of Gardner-Denver models, each with a field-proved record of performance. Let us give you the facts—write today for bulletins! Gardner-Denver Company, Quincy, Illinois.

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Model S-55—A 55-lb. drill that's the champion in its class—big drilling capacity with easy riding and conservative air consumption.

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GARDNER-DENVER

80th ANNIVERSARY YEAR

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Ricketson Mineral Color Works

Cement Process
Cement Process Corp.

Cement Pumps
Fuller Co.
Smidth, F. L., & Co.

Central Mixing Plants (Concrete)
Blaw-Knox Co.
Chain Belt Co.
Heltzel Steel & Iron Co.
Jaeger Machine Co.

Chain (Dredge and Steam Shovel)
Bucyrus-Erie Co.
Chain Belt Co.
Link-Belt Co.

Chain (Elevating and Conveying)
Bacon, Earle C., Co.
Brooks Equipt. & Mfg. Co.
Chain Belt Co.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.

Chimney Block Machines and Molds
Besser Mfg. Co.

Chutes (Bin, Truck, Concrete, Etc.)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Earl C. Bacon, Inc.
Blaw-Knox Co.
Chain Belt Co.
Chicago Bridge & Iron Co.
Eagle Iron Works
Fuller Co.
Gruendler Crusher & Pulv. Co.
Hardinge Company, Inc.
Hendrick Mfg. Co.
Jaeger Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg Co.

Chute Liners
Bacon, Earle C., Inc.
Frog, Switch & Mfg. Co.
Hendrick Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Clarifiers
Chain Belt Co.
Hardinge Company, Inc.
Link-Belt Co.

Classifiers
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Eagle Iron Works
Hardinge Company, Inc.
Link-Belt Co.
Nordberg Manufacturing Co.
Pioneer Engineering Wks., Inc.
Raymond Pulv. Division
Research Corp.
Smidth, F. L., & Co.
W. W. Sly Mfg. Co.
Traylor Engineering & Mfg. Co.
Universal Vibr. Screen Co.
Western Precipitation Co.
Williams Patent Crusher & Pulv. Co.

Clutches
Allis-Chalmers Mfg. Co.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
Stearns Mfg. Co.

Coal Pulverizing Equipment
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Babcock & Wilcox Co.
Combustion Engineering Corp.
Gruendler Crusher & Pulv. Co.
Hardinge Company, Inc.
Link-Belt Co.
Pennsylvania Crusher Co.
Raymond Pulv. Division
F. L. Smidth & Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Concrete Mixers
Anchor Concrete Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Gruendler Crusher & Pulv. Co.
Jaeger Machine Co.
Koehring Co.
Multiplex Concrete Machy. Co
Ransome Concrete Machinery Co.
Smith, T. L., Co.
Stearns Mfg. Co.

Conveyors (Apron)
Allis-Chalmers Mfg. Co.
Barber-Greene Co.
Chain Belt Co.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

Conveyors (Belt)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Earle C. Bacon
Barber-Greene Co.
Besser Mfg. Co.
Chain Belt Co.
Fuller Company
Gilmore Wire Rope Div.
Gruendler Crusher & Pulv. Co.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jones & Laughlin Steel Corp.
Link-Belt Co.
McLanahan & Stone Corp.
Multiplex Concrete Mach. Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
F. L. Smidth & Co.
Smith Engineering Works
Stearns Mfg. Co.
Traylor Engineering & Mfg. Co.
Vulcan Iron Works
Williams Patent Crusher & Pulv. Co.

Conveyors (Pneumatic)
Fuller Company
Gruendler Crusher & Pulv. Co.
Raymond Pulv. Division

Conveyors (Portable)
Austin-Western Road Machy. Co.
Barber-Greene Co.
Fuller Co.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.

Conveyors (Screw)
Besser Mfg. Co.
Chain Belt Co.
Eagle Iron Works
Gruendler Crusher & Pulv. Co.
Hardinge Company, Inc.
Link-Belt Co.

Conveyors (Vibrating)
Allis-Chalmers Mfg. Co.
Chain Belt Co.
Link-Belt Co.
Smidth, F. L., & Co.

Conveyor Idlers & Rolls
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Chain Belt Co.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Coolers
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Hardinge Company, Inc.
Link-Belt Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.
Vulcan Iron Works

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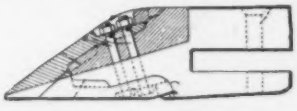

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Greater wearing surface area, hence longer life.

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Crush "One Man" Size Rock to 1¼"—¾" or Agricultural Limestone in One Operation . . .

CUTAWAY VIEW of "Slugger" showing heavy duty hammers, liners and discs.

The WILLIAMS "SLUGGER" CRUSHER AND PULVERIZER

By reducing large rock to 1¼", ¾" or agricultural size in one operation, the "Slugger" has enabled operators to produce these sizes at a low cost per ton and with small investment.

Features include—Manganese Steel Hammers, Heavy Duty Bearings, Adjustable Breaker Plate, Hammer adjustments overcome wear, Economical to operate.

The "Slugger" is built in Seven Sizes—from 30 to 150 horsepower —write for illustrative bulletins today.

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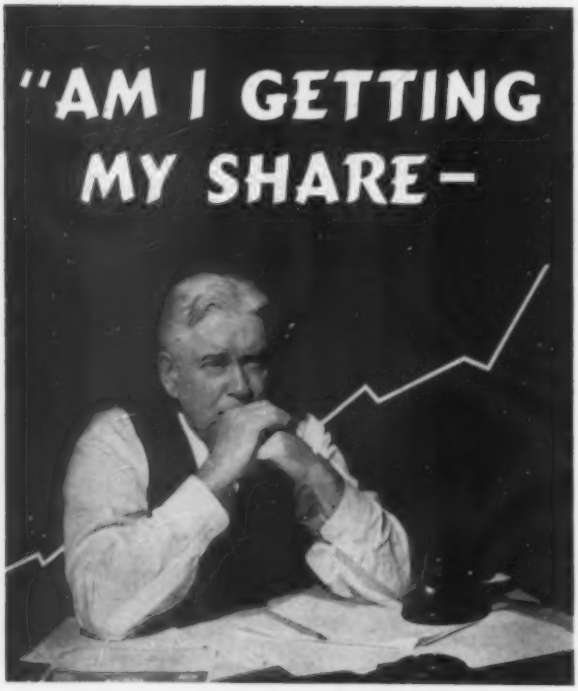

OF THE AGGREGATE AND CEMENT BUSINESS?"

There's a booming market these days for sand stone and cement, *but are old-fashioned merchandising methods keeping you from getting your share?* Are you forced to sit back and watch the other fellow get the bulk of your area's business by offering concrete materials in the form of ready-mixed concrete? Then check up on Rex Moto-Mixers. They offer you a proved method for getting bigger year-'round volume of sales of concrete materials to the growing list of ready-mixed concrete users. Quality built, engineered for tough service, they are the most profitable foundation for any successful ready-mixed concrete concern, new or old.

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REX **MOTO-MIXERS**

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Fuller Co.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Correcting Basins
F. L. Smith & Co.

Cottrell Precipitators
Research Corp.
Western Precipitation Co.

Couplings (Flexible and Shaft)
Chain Belt Co.
Link-Belt Co.
Robins Conveying Belt Co.

Cranes (Diesel Electric Steam, Etc.)
American Hoist & Derrick Co.
Austin-Western Road Machy Co.
Bucyrus-Erie Co.
Industrial Brownhoist Corp.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.
Marion Steam Shovel Co.
Northwest Engineering Co.
Thew Shovel Co.

Cranes (Truck)
Thew Shovel Co.

Crawler Attachments
Allis-Chalmers Mfg. Co.
Koehring Co.
Link-Belt Co.

Crawling Tractor Excavators
Austin-Western Road Machy Co.
Link-Belt Co.
Thew Shovel Co.

Crusher Parts
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Bacon, Earle C., Co., Inc.
Dixie Machinery Mfg. Co.
Eagle Iron Works
Frog, Switch & Mfg. Co.
Gruendler Crusher & Pulv Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Traylor Engr. & Mfg. Co.

Crushers (Cone)
Nordberg Mfg. Co.

Crushers (Hammer)
Allis-Chalmers Mfg. Co.
American Pulv. Co.
Austin-Western Road Machy. Co.
Brooks Equipment & Mfg. Co.
Dixie Machy. Mfg. Co.
Gruendler Crusher & Pulv. Co.
Hardinge Company, Inc.
Pennsylvania Crusher Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Jaw and Gyratory)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Earle C. Bacon, Inc.
Brooks Equipment Mfg. Co.
Dixie Machinery Mfg. Co.
Gruendler Crusher & Pulv. Co.
Hardinge Company, Inc.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Laboratory)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Bacon, Earle C., Co.
Dixie Machinery Mfg. Co.
Gruendler Crusher & Pulv. Co.
Hardinge Company, Inc.
Pennsylvania Crusher Co.
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Primary Breakers)
Allis-Chalmers Mfg. Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Reduction)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.

Crushers (Ring)
American Pulverizer Co.
Dixie Machinery Mfg. Co.
Gruendler Crusher & Pulv. Co.
Hardinge Company, Inc.
McLanahan & Stone Corp.
Williams Patent Crusher & Pulv. Co.

Crushers (Roll)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Babcock & Wilcox Co.
Bacon, Earle C., Co.
Besser Mfg. Co.
Brooks Equipment & Mfg. Co.
Eagle Iron Works
Gruendler Crusher & Pulv. Co.
Hardinge Company, Inc.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Vulcan Iron Works
Williams Patent Crusher & Pulv. Co.

Crushing Rolls
Austin-Western Road Machy. Co.
Eagle Iron Wks.
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushing and Screening Plants (Portable)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Blaw-Knox Co.
Brooks Equipment & Mfg. Co.
Dixie Machinery Mfg. Co.
Eagle Iron Works
Gruendler Crusher & Pulv. Co.
Heltzel Steel Form & Iron Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Smith Engineering Works
Traylor Engineering & Mfg. Co.
Tyler, W. S. Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Curing Racks
Besser Mfg. Co.
Multiplex Concrete Machy. Co.
Stearns Mfg. Co.

Decks, Vibrating Screen
Hendrick Mfg. Co.

Dedusters
Blaw-Knox Co.
Western Precipitation Co.

Derricks
American Hoist & Derrick Co.
Hayward Company

Detonators
Atlas Powder Company
Ensign-Bickford Co.
Hercules Powder Co.

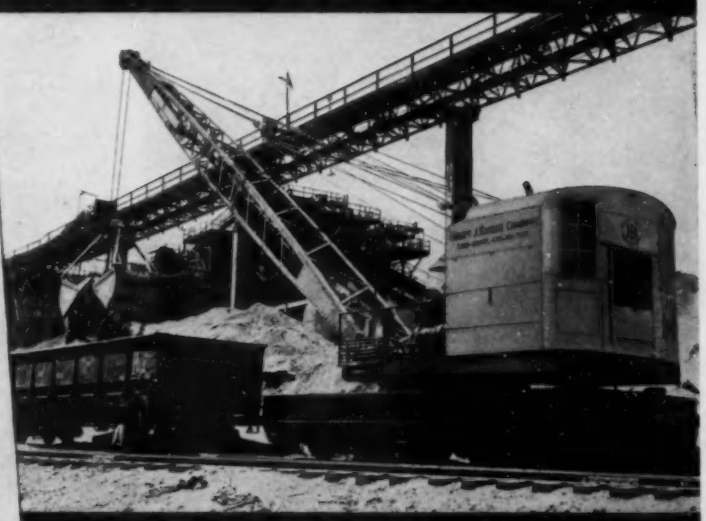
Power to Spare - -

BUT A MISER ON FUEL

One of the distinct advantages of Industrial Brownhoist Diesel cranes is the way they dig in and pull when the work gets hard — the way they travel at sustained speeds, up to 15 miles per hour.

Another advantage — and an important one — is the increase in working hours and the decrease in fuel costs these Industrial Brownhoists effect. Most owners figure on two extra hours of work a day over a steam crane; many tell us they save from 25% to 50% on fuel. The combination of the two makes a difference of a good many dollars in the course of a year.

Industrial Brownhoist Diesel cranes are built in capacities of 10 to 50 tons and for all kinds of bucket, hook and magnet work. A new booklet, describing all of them, will be sent you, on request.



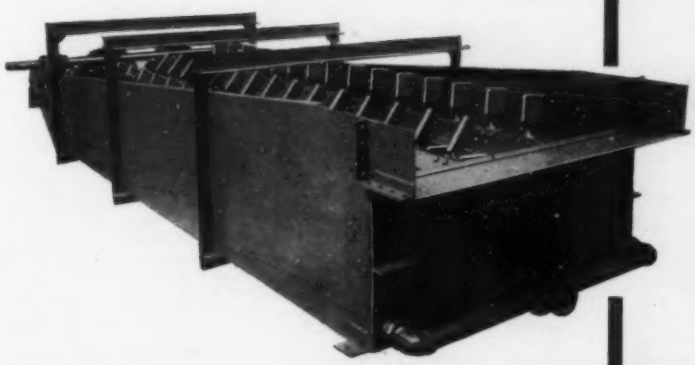
INDUSTRIAL BROWNHOIST

BAY CITY, MICHIGAN

DISTRICT OFFICES: NEW YORK, PHILADELPHIA, PITTSBURGH, CLEVELAND, CHICAGO

Agents in other Principal Cities

DIRECT SAVINGS THAT ADD TO PROFITS . . . . .



Are you letting mud, sticks, leaves, silt, slate and clay balls cut the quality of your sand and gravel, consequently reducing your profits?

With an EAGLE WASHER you can thoroughly scrub your aggregates and produce a product able to meet the strictest specifications. You can even turn deposits which were previously considered unprofitable into real money makers.

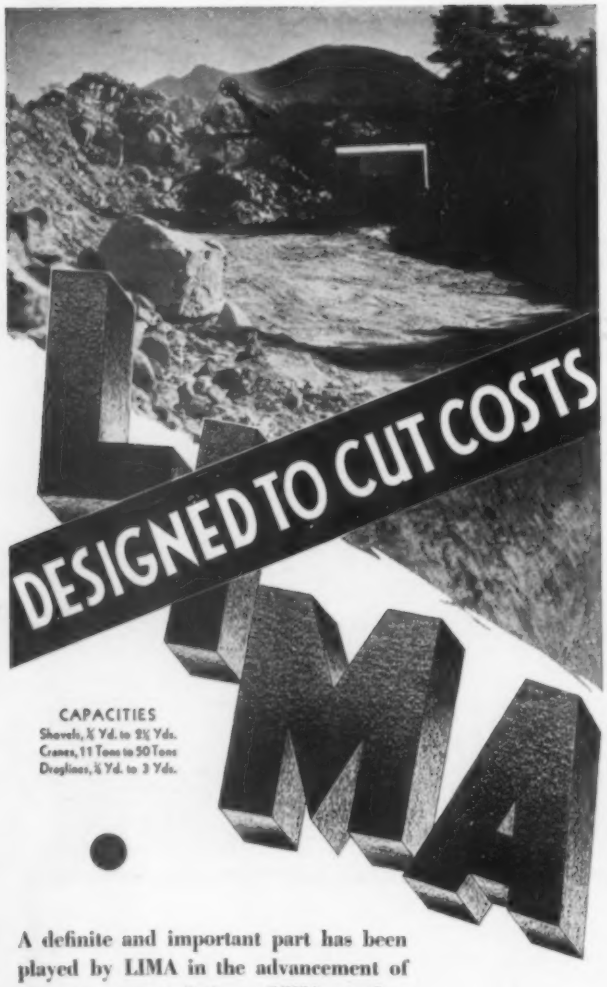
The Paddle Type Log Washer illustrated, through the greater action of the paddles, is extremely effective for breaking down and removing those difficult, tough clays and cemented aggregates found in some gravels.

All EAGLE WASHERS are built of the highest quality material and are designed for extremely high efficiency, low operating cost, large capacity and long life.

Write today for descriptive literature about EAGLE PADDLE TYPE LOG WASHERS, EAGLE SCREW WASHERS and EAGLE "SWINTEK" SCREEN NOZZLE LADDERS.

EAGLE IRON WORKS

DES MOINES, IOWA



A definite and important part has been played by LIMA in the advancement of power excavator design. LIMA was first to introduce anti-friction bearings at every vital bearing point.

Later, efficient helical cut gears replaced the old-fashioned spur gears.

To these two important features were supplemented spline shafts, square lever shafts, and many other important advantages, all of which, when combined, result in a quiet, economical and smooth running excavator that lowers operating costs and increases production on any construction or material handling job requiring shovels, draglines or cranes.

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LIMA LOCOMOTIVE WORKS, Incorporated
SHOVEL AND CRANE DIVISION
LIMA, OHIO - - - - U. S. A.

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SAN FRANCISCO 235 Bayshore Boulevard | LOS ANGELES 2001 Santa Fe Avenue | SEATTLE 1932 First Avenue South
General Supply Co. of Canada, Ltd., Ottawa, Ont. | Tyee Machinery Company, Vancouver, B. C.

SHOVELS • DRAGLINES • CRANES

Classified Directory (Cont.)

Dewatering Machines
Allis-Chalmers Mfg. Co.
Chain Belt Co.
Eagle Iron Wks.
Hardinge Company, Inc.
Jaeger Machine Co.
Link-Belt Co.

Dippers & Teeth (Dredge & Shovel
Bucyrus-Erie Co.
Frog, Switch & Mfg. Co.
Koehring Co.
Link-Belt Co.
Marion Steam Shovel Co.
Thew Shovel Co.

Disentegrators
Smidth, F. L., & Co.

Ditchers
Barber-Greene Co.
Bucyrus-Erie Co.
Link-Belt Co.
Marion Steam Shovel Co.

Dragline & Cableway Excavators
American Cable Co.
American Hoist & Derrick Co.
American Steel & Wire Co. (U. S. Steel Corp. Subsi.)
Austin-Western Road Machy Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Columbia Steel Co. (U. S. Steel Corp. Subsi.)
Hazard Wire Rope Co.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.
Marion Steam Shovel Co.
Northwest Engineering Co.
Pioneer Engineering Wks Inc.
Sauerman Bros., Inc.
Thew Shovel Co.

Dredges
American Hoist & Derrick Co.
Bucyrus-Erie Co.
Eagle Iron Works
Hayward Co.
Hetherington & Berner, Inc (Complete Steel)
Link-Belt Co.
Marion Steam Shovel Co.

Dredge Cutter Heads & Ladders
Bucyrus-Erie Co.
Eagle Iron Wks.
Hetherington & Berner, Inc.

Dredging Sleeves
Hetherington & Berner, Inc.
Thermoid Rubber Company

Drills (Wagon)
Gardner-Denver Co.

Drill Sharpening Machines
Bucyrus-Erie Co.
Gardner-Denver Co.

Drill Steel
Bethlehem Steel Co.
Gardner-Denver Co.

Drives (Belt, Chain and Rope)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Co.
Chain Belt Co.
Link-Belt Co.
Smidth, F. L., & Co.

Drives (Short Center)
Allis-Chalmers Mfg. Co.
Earle C. Bacon, Inc.
Chain Belt Co.
Link-Belt Co.
Smidth, F. L., & Co.

Dryers
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Combustion Engineering Corp.
Gruendler Crusher & Pulv. Co.
Hardinge Company, Inc.
Hetherington & Berner, Inc.
Link-Belt Co.
McLanahan & Stone Corp.
Raymond Pulv. Division
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.
Tyler, W. S., Co.
Vulcan Iron Works
Western Precipitation Co.
Williams Patent Crusher & Pulv. Co.

Dust Arrestors
Blaw-Knox Co.
Research Corp.
Western Precipitation Co.

Dust Collecting Systems
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Buell Engineering Co., Inc.
Chicago Bridge & Iron Co.
Hendrick Mfg. Co.
Raymond Pulv. Division
Research Corp.
Smidth, F. L., & Co.
W. W. Sly Mfg. Co.
Western Precipitation Co.

Dust Conveying Systems
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Fuller Company
Raymond Pulv. Division
Research Corp.
W. W. Sly Mfg. Co.
Western Precipitation Co.

Dust Precipitators and Recovery Plants
Western Precipitation Co.
Research Corp.
W. W. Sly Mfg. Co.

Electric Cables
General Electric Co.

Electric Motors
Allis-Chalmers Mfg. Co.
General Electric Co.
Hayward Co.

Electric Motor Starters
Allis-Chalmers Mfg. Co.
General Electric Co.

Elevators
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Co.
Barber-Greene Co.
Besser Mfg. Co.
Chain Belt Co.
Eagle Iron Works
Fuller Company
Gruendler Crusher & Pulv. Co.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jaeger Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Multiplex Concrete Mach. Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Smith Engineering Works
Stearns Mfg. Co.
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Engineers (Designing & Consulting)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Co.
Blaw-Knox Co.
Fuller Co.
Gruendler Crusher & Pulv. Co.
Hetherington & Berner, Inc.
Link-Belt Co.
McLanahan & Stone Corp.
Productive Equipment Corp
Robins Conveying Belt Co.
F. L. Smidth & Co.
Traylor Engineering & Mfg. Co.
Williams Patent Crusher & Pulv. Co.
W. W. Sly Mfg. Co.

Engines (Diesel, Gasoline, Kerosene and Oil)
Allis-Chalmers Mfg. Co.
American Hoist & Derrick Co.
Caterpillar Tractor Company
Cummins Engine Co. (Diesel)
National Supply Company
Nordberg Mfg. Co.
Superior Diesel

Engines (Natural Gas)
Allis-Chalmers Mfg. Co.

Engines (Steam)
Allis-Chalmers Mfg. Co.
American Hoist & Derrick Co.
Nordberg Mfg. Co.
Vulcan Iron Works

Exhausters
Combustion Engineering Corp.
Raymond Pulv. Div.

VULCAN
Rotary
Kilns
This is one of the two 300' x 10' Vulcan kilns installed in one of America's most recently modernized cement plants. Many other prominent operators have found that VULCAN KILNS meet the most exacting requirements of the cement industry.
Our engineers are always glad to cooperate with you in the selection of the equipment that will best serve your purposes. Send for illustrated literature covering the entire line of VULCAN equipment including Electric Hoists, Hoisting Engines, Mining Machinery, Lime Burning and Chemical Machinery, Cement Machinery and Locomotives.
VULCAN IRON WORKS
Engineers and Builders
Wilkes-Barre, Pennsylvania
407 S. Dearborn St.
CHICAGO
50 Church St.
NEW YORK

WHY 3 COMPANIES—*A Crushing Plant and Two Cement Mills*—INSTALLED SLY DUST FILTERS

1

*** To Eliminate the Dust Nuisance**

"... the dust nuisance was the first consideration in making these installations and we are very well satisfied with the results."

2

*** For Better Relations With Workers**

"... we have found that, when the workers recognize the desire of the management to provide them with clean, healthy working areas, they immediately show a greater interest in their work, and in maintaining the premises clean and the equipment in working order."

3

*** To Clean Up the Plants**

"... our decision to install collectors at our various plants was brought about more by the desire to clean up the plants and improve conditions in general, and I might say that wherever we have made installations we have accomplished all that we set out to do. All our plant superintendents are very well satisfied with your installations and as you know, we are again installing a number of your collectors this winter, which should be pretty good evidence that we thoroughly believe in them."

Sly Dust Control is *not* expensive—it's a paying investment—ask for bulletin R-90—Dust Control.

Thousands of satisfied users

THE W. W. SLY MANUFACTURING CO.

4746 Train Avenue Branch Offices in Principal Cities Cleveland, Ohio

WHEREVER LOADING IS DONE BY HAND, one Brooks Load-Lugger and 5 to 10 Load-Lugger Buckets may replace an equal number of trucks, distance of haul considered. Cut hauling investments of unnecessary trucks . . . stop the heavy time and money loss of trucks standing idle for loading. In excavation work, stone quarries, road work, concrete aggregate hauling, W.P.A. projects, snow removal, and countless other operations, the Brooks Load-Lugger means tremendous savings. Built in four capacities . . . mountable on any truck chassis in a few hours. ONE PIECE Buckets. Write or wire for details and completely illustrated folder NOW.

BROOKS EQUIPMENT & MFG. CO.

90 Davenport Road, Knoxville, Tenn.

STA-TRU

Long-Mesh

Woven Wire Screens

made to work under tension and vibration.

The straight stay-bars carry ALL the tension. The crimps in the round wires can not be stretched or broken. The screen can not be caused to sag or split by the pull of the tensioning device.

LUDLOW-SAYLOR

WIRE CO. ST. LOUIS

Classified Directory (Cont.)

Explosives
Atlas Powder Company
Hercules Powder Co.

Fans (Exhaust & Ventilating)
Blaw-Knox Co.
General Electric Co.
Gruendler Crusher & Puv. Co.
Smidth, F. L., & Co.
W. W. Sly Mfg. Co.

Feeders
Allis-Chalmers Mfg. Co.
Earle C Bacon, Inc.
Babcock & Wilcox Co.
Barber-Greene Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Fuller Co.
Gruendler Crusher & Pulv Co.
Hardinge Company, Inc.
Hetherington & Berner, Inc.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Schaffer Poidometer Co.
Smidth, F. L., & Co.
Smith Engr. Wks.
Stearns Mfg. Co.
Traylor Engineering & Mfg. Co.

Filter Cloth
Roebling's, John A., Sons Co.,
Tyler, W. S., Co.

Fly Ash Collectors
Research Corp.
Western Precipitation Co.

Frogs & Switches
Easton Car & Construction Co.
Frog, Switch & Mfg. Co.

Fuels (Diesel)
Texas Co

Fume Collectors
Research Corp.
Western Precipitation Co.

Fuse Cutters
Ensign-Bickford Co.

Fuse Lighters
Ensign-Bickford Co.

Fuses (Detonating and Safety)
Atlas Powder Company
Ensign-Bickford Co.
Hercules Powder Co.

Gasoline
Gulf Refining Co.
Texas Company

Gas Producers
Blaw-Knox Co.

Gas Scrubbers
Research Corp.
Western Precipitation Co.

Generators & Motor Generator Sets
Allis-Chalmers Mfg. Co.
General Electric Co.
National Supply Company
Nordberg Mfg. Co.
Superior Diesel

Gloves
W. W. Sly Mfg. Co.

Grease
Bacon, Earle C., Co.
Gulf Refining Co.
Texas Company

Guards (Lamp)
Flexible Steel Lacing Co.

Guards (Machinery)
Harrington & King Perforating Co.
Hendrick Mfg. Co.
Tyler, W. S., Co.

Gypsum Plants
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
Traylor Engr. & Mfg. Co.

Haulage Systems (Electric)
General Electric Co.

Haulage Systems (Remote Control)
General Electric Co.
Koehring Co.

Heaters (Bitumen)
Easton Car & Construction Co.

Hoists (Chain, Electric, Portable, Skip, Etc.)
Allis-Chalmers Mfg. Co.
American Hoist & Derrick Co.
Besser Mfg. Co.
Chain Belt Co.
Commercial Shearing & Stamping Co.
Eagle Iron Works
Easton Car & Construction Co.
Gardner-Denver Co.
Gruendler Crusher & Pulv. Co.
Hetherington & Berner, Inc.
Jaeger Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Northwest Engineering Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Sauerman Bros., Inc.
Smith Engr. Wks.
Stearns Mfg. Co.
Traylor Engineering & Mfg. Co.
Vulcan Iron Works

Hoppers
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Chicago Bridge & Iron Co.
Gruendler Crusher & Pulv. Co.
Hardinge Company, Inc.
Heltzel Steel Form & Iron Co.
Hendrick Mfg. Co.
Jaeger Machine Co.
Link-Belt Co.
Pioneer Engineering Wks., Inc.
Robins Conveying Belt Co.
Traylor Engineering & Mfg. Co.

Hose (Water, Steam, Air Drill, Pneumatic, Sand Suction and Discharge)
Dixie Machinery Mfg. Co.
Hetherington & Berner, Inc.
Jaeger Machine Co.
W. W. Sly Mfg. Co.
Thermoid Rubber Company

Hydrators (Lime)
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Hardinge Company, Inc.
Traylor Engr. & Mfg. Co.
Vulcan Iron Works

Jigs (Sand and Gravel)
Allis-Chalmers Mfg. Co.
Hardinge Company, Inc.
Traylor Engineering & Mfg. Co.

Joists & Slab Machines (Concrete)
Besser Mfg. Co.

Kilns Parts
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Hardinge Company, Inc.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Kilns (Rotary)
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Hardinge Company, Inc.
F. L. Smidth & Co.
Traylor Engineering & Mfg. Co.
Vulcan Iron Works

Kilns (Shaft)
Hardinge Company, Inc.

Kilns (Vertical)
Blaw-Knox Co.
Chicago Bridge & Iron Co.
Hardinge Company, Inc.
Vulcan Iron Works

Kiln Burners
Babcock & Wilcox Co.
Smidth, F. L., & Co.

Kiln Chain Systems
Smidth, F. L., & Co.

Kiln Liners (Metal)
Hardinge Company, Inc.
Traylor Engr. & Mfg. Co.

Classified Directory (Cont.)

Kominuters
Smidth, F. L., & Co.

Laboratory Apparatus
Smidth, F. L., & Co.

Lift Trucks
Besser Mfg. Co.
Stearns Mfg. Co.

Lime Handling Equipment
Chicago Bridge & Iron Co.
Combustion Engineering Corp.
Fuller Co.
Hardinge Company, Inc.
Link-Belt Co.
Raymond Pulv. Division
Robins Conveying Belt Co.
Traylor Engineering & Mfg. Co.

Lime Plants
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Blaw-Knox Co.
Gruendler Crusher & Pulv. Co.
Hardinge Company, Inc.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.

Lime Putty Plants
Chicago Bridge & Iron Co.

Loaders (Bin, Car, Hopper, Truck, Etc.)
Barber-Greene Co.
Besser Mfg. Co.
Bucyrus-Erie Co.
Chain Belt Co.
Fuller Company
Gardner-Denver Co.
Gruendler Crusher & Pulv Co.
Link-Belt Co.
Marion Steam Shovel Co.
Northwest Engineering Co.
Robins Conveying Belt
Ross Screen & Feeder Co.
Stearns Mfg. Co.

Loaders (Underground)
Allis-Chalmers Mfg. Co.
Bucyrus-Erie Co.
Nordberg Mfg. Co.
Thew Shovel Co.

Locomotive Stack Netting
Tyler, W. S., Co.

Locomotives (Diesel-Electric)
Davenport-Besler Corp.
Vulcan Iron Works

Locomotives (Electric, Trolley & Storage Battery)
Davenport-Besler Corp.
General Electric Co.
Vulcan Iron Works

Locomotives (Gasoline & Gas-Electric)
Davenport-Besler Corp.
Vulcan Iron Works

Locomotives (Oil & Oil-Electric)
General Electric Co.
Vulcan Iron Works

Locomotives (Steam)
Davenport-Besler Corp.
Vulcan Iron Works

Lubricants
Bacon, Earle C., Inc.
Gulf Refining Co.
Robins Conveying Belt Co.
Texas Co.

Magnetic Separators
Allis-Chalmers Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Manhole Block Machine (Concrete)
Stearns Mfg. Co.

Material Handling Equipment
Austin-Western Road Machy. Co.
Barber-Greene Co.
Chain Belt Co.
Fuller Company
Gruendler Crusher & Pulv. Co.
Hardinge Company, Inc.
Heltzel Steel Form & Iron Co.
Link-Belt Co.
Raymond Pulv. Division
Robins Conveying Belt Co.

Measuring Devices
Blaw-Knox Co.
Fuller Co.
Hardinge Company, Inc.
Heltzel Steel Form & Iron Co.
Jaeger Machine Co.
Schaffer Poidometer Co.

Mechanical Rubber Goods
Thermoid Rubber Company

Mill Parts
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Gruendler Crusher & Pulv Co.
Hardinge Company, Inc.
Smidth, F. L., & Co.
Traylor Engineering & Mfg Co.

Mills, Grinding (Ball, Tube, Hammer, Rod, Roll, Etc.) (See also Pulverizers)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Babcock & Wilcox Co.
Brooks Equipment & Mfg. Co
Combustion Engineering Corp.
Dixie Machinery Mfg. Co.
Gruendler Crusher & Pulv Co.
Hardinge Company, Inc.
Pennsylvania Crusher Co.
Raymond Pulv. Division
F. L. Smidth & Co.
Traylor Engineering & Mfg Co.
Vulcan Iron Works
Williams Patent Crusher & Pulv. Co.

Mill Liners
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Dixie Machy. Mfg. Co.
Hardinge Company, Inc.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Mortar Colors
Mepham, Geo. S., Corp.
Ricketson Mineral Color Works

Mortar Mixers
Chain Belt Co.
Eagle Iron Works
Gruendler Crusher & Pulv Co.
Jaeger Machine Co.

Nozzles (Gravel Washing)
Chain Belt Co.
Link-Belt Co.

Oil Burners
Smidth, F. L., & Co.

Oils (Lubricating)
Bacon, Earle C., Inc.
Gulf Refining Co.
Robins Conveying Belt Co.
The Texas Co.

Oils (Cutting)
The Texas Co.

Ornamental Forms (Concrete)
Besser Mfg. Co.

Outdoor Lighting Equipment
General Electric Co.

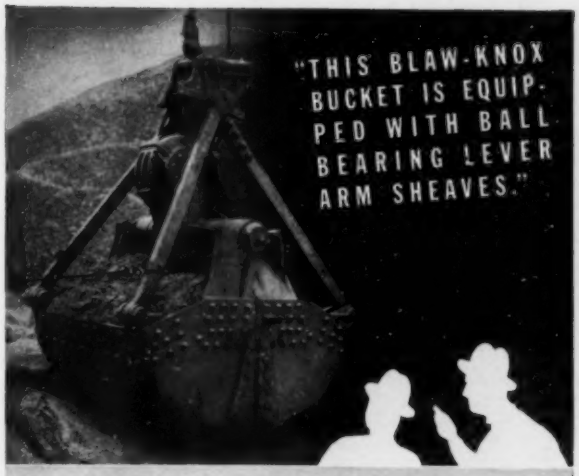
Packing
Thermoid Rubber Company

Pallets
Anchor Concrete Machinery Co.
Bacon, Earle C., Inc.
Besser Mfg. Co.
Commercial Shearing and Stamping Co.
Multiplex Concrete Machy Co.
Stearns Mfg. Co.

Pans, Grinding (Wet & Dry)
Eagle Iron Works
McLanahan & Stone Corp.
Traylor Engineering & Mfg. Co.

Perforated Metal
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chicago Perforating Co.
Gruendler Crusher & Pulv Co.
Harrington & King Perf. Co.
Hendrick Mfg. Co.
Link-Belt Co.
Pioneer Engineering Wks. Inc.
Robins Conveying Belt Co.
Joseph T. Ryerson & Son, Inc.
Standard Stamping & Perforating Co.
Traylor Engr. & Mfg. Co.

Perforated Screen Plates & Cloth—See Screen Cloth & Plates



As a matter of fact this feature is standard equipment and does not cost more. It is especially desirable where the bucket handles loose granular materials because it keeps lubrication in and dirt out. This and many other desirable features of Blaw-Knox Buckets is fully described and illustrated in Bulletin No. 1606. Write for it today.

17

BLAW-KNOX Digging and Rehandling BUCKETS
BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.

Why aren't you using Perforated Plate . . . . on VIBRATING SCREENS?

Perhaps we are prejudiced—being a pioneer producer of perforated plate.

But—

Perforated plate has so many advantages for vibrating screens that we honestly wonder why operators use any other material. The full clearance of perforated plate prevents clogging . . . its uniform mesh is maintained throughout the life of the screen . . . it is available in a high carbon analysis—heat treated —hard . . . tough . . . resistant to abrasion . . .

Write for the full story of perforated plate on vibrating screens.

HENDRICK MANUFACTURING CO.
47 Dundaff St., Carbondale, Pa.
SALES OFFICES IN PRINCIPAL CITIES
PLEASE CONSULT TELEPHONE DIRECTORY
Makers of Elevator Buckets of all types, Mitco Open Steel Flooring, Mitco Shur-Site Treads and Mitco Armorgrids. Light and Heavy Steel Plate Construction.

Big Savings
. . . IN HANDLING MATERIALS

Sauerman Cableway lifts gravel from deep under water to top of plant.

Digging bank gravel is easy one-man job with Sauerman Drag Scraper.

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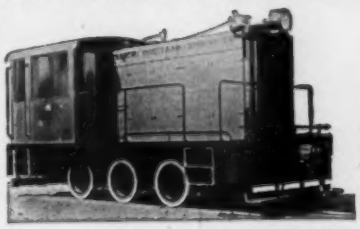

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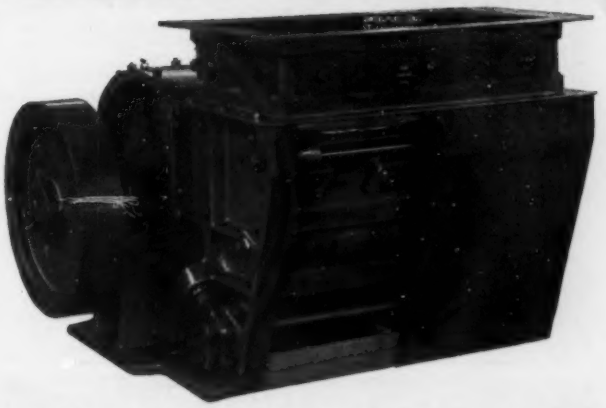

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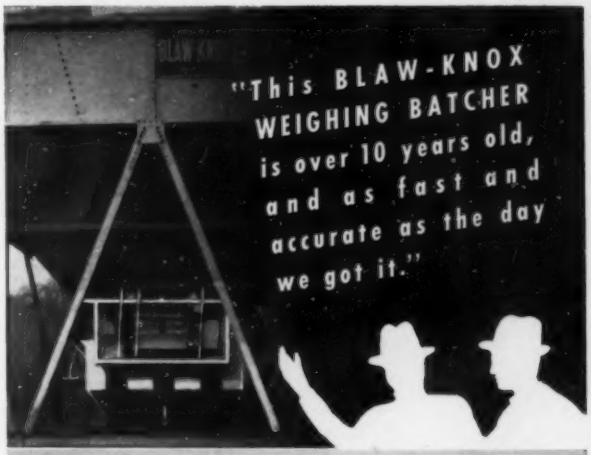

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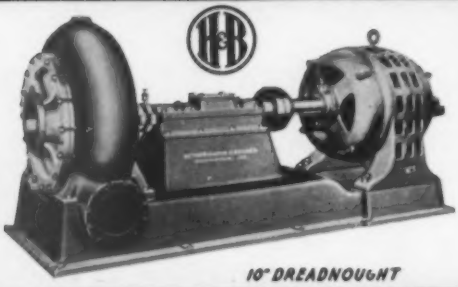

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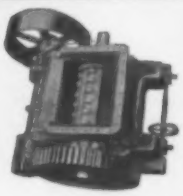

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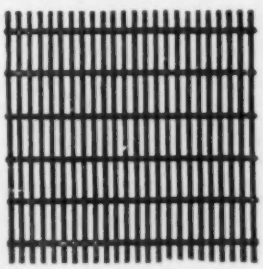

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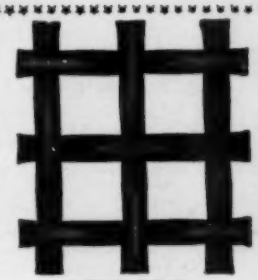

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7—Traylor Vibrating Screens; 2 FB-2 and 5 FB-4, 48"x84" double deck.

1—6" Rumsey Centrifugal Pump with direct connected 100 H.P. motor.

3—Rotary Scrubbers or Washers, 4'x6' and 4'x8', each with 20 H.P. motor.

4—Sand Boxes or Drags; 2-18' c/c with 4' wide blades, 2-24' c/c with 3' wide blades.

Equipment Remaining at White Cliffs, Ark., Plant

2—4-roll Raymond High Side Pulverizers.

1—5'x30' Ruggles-Coles Direct Heat Rotary Dryer.

1—30"x54" Single Roll Crusher.

1—No. 4 Williams Jumbo Hammer Mill.

8—18" Belt Conveyors, various lengths.

2—40' Bucket Elevators, 9x18" buckets.

1—No. 30 Caterpillar Tractor.

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4—3'x6' Sturtevant MV Screens, 2 deck.

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3-deck 3' x 8' Jigger, 3-deck 3' x 6' Deister Plato Vibrating Screens.
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1—15-cu. ft. Hayward Orange peel bucket.
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1—275 bbl. Johnson portable bulk cement plant with 1,000 lbs. weight batcher, bucket elevator & car unloader.

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1—4-yd. class G Hayward clamshell.

35—Williams, Blaw Knox & Owen clamshell, all sizes and types.

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1—12 ton Brownhoist gas powered locomotive crane No. 2, ser. No. 8331, 8 wheel, 40′ boom.

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INDEX TO ADVERTISERS

Allis-Chalmers Mfg. Co....14-15
American Cable Co.....Inside Back Cover
American Hoist and Derrick Co. 85
American Pulverizer Co.....111
American Steel & Wire Co... 18
Anchor Concrete Machy. Co.. 80
Atlas Powder Co.....120

Babcock & Wilcox Co.....Front Cover
Bacon, Earle C., Inc..... 96
Barber-Greene Co. 5
Besser Mfg. Co..... 66
Bethlehem Steel Co..... 10
Blaw-Knox Co. 107, 111
Brooks Equipment & Mfg. Co. 106
Bucyrus-Erie Co. .....Outside Back Cover
Buell Engineering Co., Inc... 3

Caterpillar Tractor Co..... 31
Cement Process Corp.....111
Chain Belt Co.....102
Chicago Bridge & Iron Co...110
Chicago Perforating Co.....113
Classified Advertising....114-117
Cleveland Wire Cloth & Mfg. Co. 113
Columbia Steel & Wire Co... 18
Combustion Engineering Co., Inc. 23
Commercial Shearing & Stamping Co. 70
Cummins Engine Co..... 97

Davenport Besler Corp.....109
Dempster Bros., Inc.....110
Dixie Machinery Mfg. Co..... 88

Eagle Iron Works.....103
Easton Car & Construction Co. 30
Ensign-Bickford Co..... 26

Flexible Steel Lacing Co..... 29
Ford Motor Co. 24
Frog, Switch & Mfg. Co...101
Fuller Co. 112

Gardner Denver Co. 100
General Electric Co.....Inside Front Cover
Gruendler Crusher & Pulv. Co. 86
Gulf Refining Co..... 99

Hardinge Co., Inc..... 16
Harrington & King Perf. Co. 88
Hayward Co. 113
Hazard Wire Rope Div.....Inside Back Cover
Heltzel Steel Form & Iron Co. 113
Hendrick Mfg. Co.....107
Hercules Powder Co..... 17
Hetherington & Berner, Inc..112

Industrial Brownhoist Corp..103

Jaeger Machine Co.....8-9, 87

Koehring Co. 6

Leschen, A., & Sons Rope Co. 79
Lima Locomotive Works, Inc. (Shovel & Crane Div.)...104
Link-Belt Co. 109
Ludlow-Saylor Wire Co.....106

McLanahan & Stone Corp...112
Marion Steam Shovel Co..... 27
George S. Mepham & Co..... 80
Multiplex Concrete Machinery Co. 70

National Supply Co..... 12
Nordberg Mfg. Co. 21
Northwest Engineering Co.. 20

Pennsylvania Crusher Co...112
Pioneer Engineering Works, Inc. 1
Portland Cement Association 70
Productive Equipment Corp..113

Raymond Pulverizer Division 23
Research Corp. 25
Ricketson Mineral Wks..... 80
Robins Conveying Belt Co... 32
Roebling's, John A., Sons Co. 81
Ross Screen & Feeder Co... 96
Ryerson, Jos. T., & Sons, Inc. 113

Sanford-Day Iron Works... 19
Sauerman Bros. 108
Schaffer Poidometer Co.... 89
Screen Equipment Co..... 86
Sly, W. W., Mfg. Co.....105
Smidth, F. L., & Co..... 28
Smith Engineering Works... 11
Smith, T. L., Co.....118
Standard Stamping & Perforating Co. 89
Stearns Mfg. Co. 74
Suburban Sanitation Systems Co. 80
Superior Diesel 12

Texas Co. 4
Thermoid Rubber Co.....119
Thew Shovel Co. 13
Traylor Engineering & Mfg. Co. 7
Tyler, W. S., Co.....108

United States Steel Corp.... 18
Universal Concrete Pipe Co., Inc. 80
Universal Vibrating Screen Co. 87

Vulcan Iron Works.....105

Western Precipitation Corp.. 25
Wilfley, A. R., & Sons, Inc..113
Williams Patent Crusher & Pulverizer Co.....101

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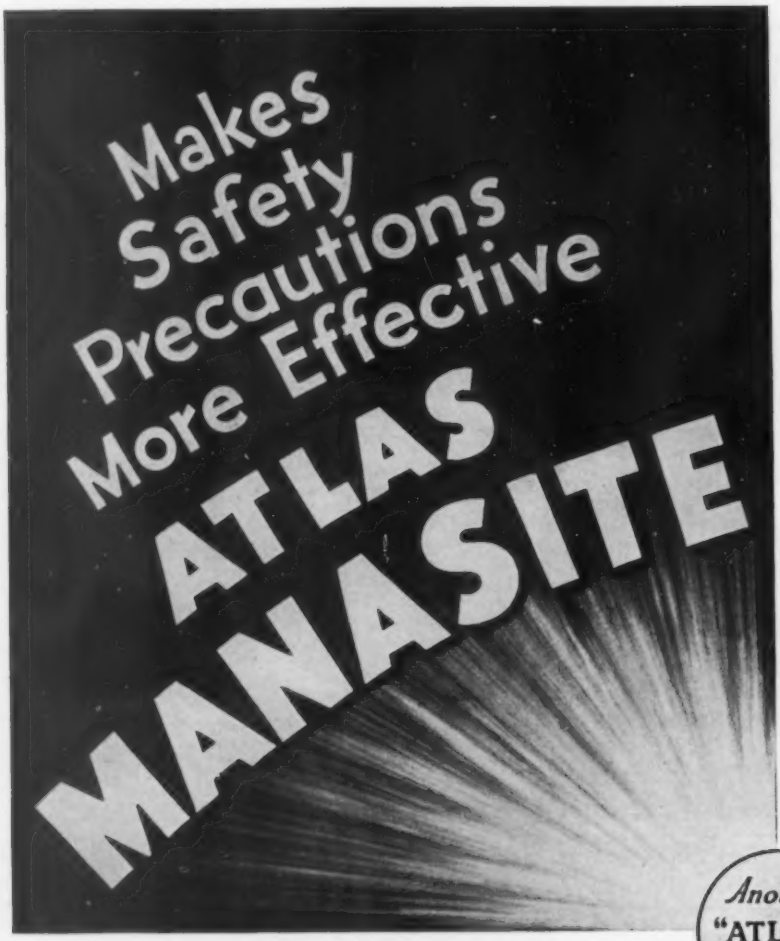

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